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SASKATCHEWAN GROWN FRUIT ON EXHIBITION

Fruit Gardening in Saskatchewan

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UNIVERSITY OF SASKATCHEWAN
COLLEGE OF AGRICULTURE
1950

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Fruit Gardening in Saskatchewan

By C. F. PATTERSON

FRUIT GROWING in the largest prairie province of Canada has come to stay. While few years have passed since the first cultivated fruits grown in this section of the West came into being, this branch of Horticulture has developed to the point where it has become an integral part of Saskatchewan agriculture. In its short history in Saskatchewan, fruit growing has made great progress and where few fruit plantations existed fifteen years ago many hundreds of such plantations are found today. Fruits in considerable variety have demonstrated their ability to thrive and to yield well in Saskatchewan gardens and each year new varieties are brought forth to extend and to supplant previously established lists.

FRUITS THAT MAY BE GROWN

Fruits that have been found to do well over large areas in Saskatchewan and that are recommended are as follows: crabapples, plums, cherries, red raspberries, strawberries, currants and gooseberries. Only certain varieties of each of these are to be recommended, however. Many varieties are too tender for Saskatchewan conditions or are undesirable in some other respect. A few kinds that are being grown in a very small way, and usually with special treatment and which are of relatively little importance at the present time, are: apples, purple-cane raspberries, black raspberries and grapes. The plants of these lack extreme hardiness and while considerable fruit may be obtained under special conditions, the returns usually fail to justify the care and the labor involved.

FRUITS THAT THE BEGINNER SHOULD GROW

The fruits to be recommended for a beginner's plantation will be determined mainly by the size of the area to be planted; whether this area is an urban or a farm garden; and whether or not the moisture supply will be abundant. It is important that the beginner plant fruits that are certain to succeed. The tree fruits (crabapples, plums and cherries), currants and gooseberries will thrive in most parts of the Province without artificial waterings, provided good cultural practices are adopted, while the red raspberry and the strawberry usually demand some irrigation. Strawberries, raspberries, currants, gooseberries and certain cherries demand relatively little space and can be grown in small areas. Trees of the crabapple and plum, on the other hand, require much space and are not suited for use in a small garden. For a farm garden, crabapples, plums and cherries might comprise the initial planting. If moisture conditions in the district are usually good, or where a few tanks of water could be used during the season, plants of red raspberry and strawberry might be included. In the small urban garden, the plantings of tree fruits could be limited to cherries. Either strawberries and red raspberries or currants and gooseberries, depending upon moisture supply, might make up the remainder of the plantings. Even where space will permit the planting of one kind only, the use of any one of the fruits suggested for the small garden will make a worthwhile plantation.

LOCATION OF THE FRUIT PLANTATION

On the farm, the fruit plantation should be conveniently located and in an area that has good surface drainage. High areas and steep slopes should be avoided. A very gentle slope is desirable and one facing either the east or the north is preferable to one facing the south. A moderately flat area is not objectionable provided water does not lie on the surface for long periods following heavy rains. Good air drainage is desirable and the area to be planted in fruits should be so located that the coldest air may settle to a lower level. Areas in which the soil contains appreciable amounts of so-called "Alkali" are not suitable for the fruit garden. On a city or town lot the fruits to be grown can usually be planted at one side of the garden area to advantage. The fruit plants should be far enough away from other plants to permit growth without serious competition.

SHELTER FOR THE FRUIT GARDEN

Good shelter from the winds is a prime requisite in fruit growing. Fruits cannot be expected to do well in exposed areas. Shelter should be provided on the north, west and south sides of the area, at least, and shelter on the east side is usually advantageous. Where a good belt of trees provides protection for the buildings and yards, an area inside such a shelter leaves little to be desired.

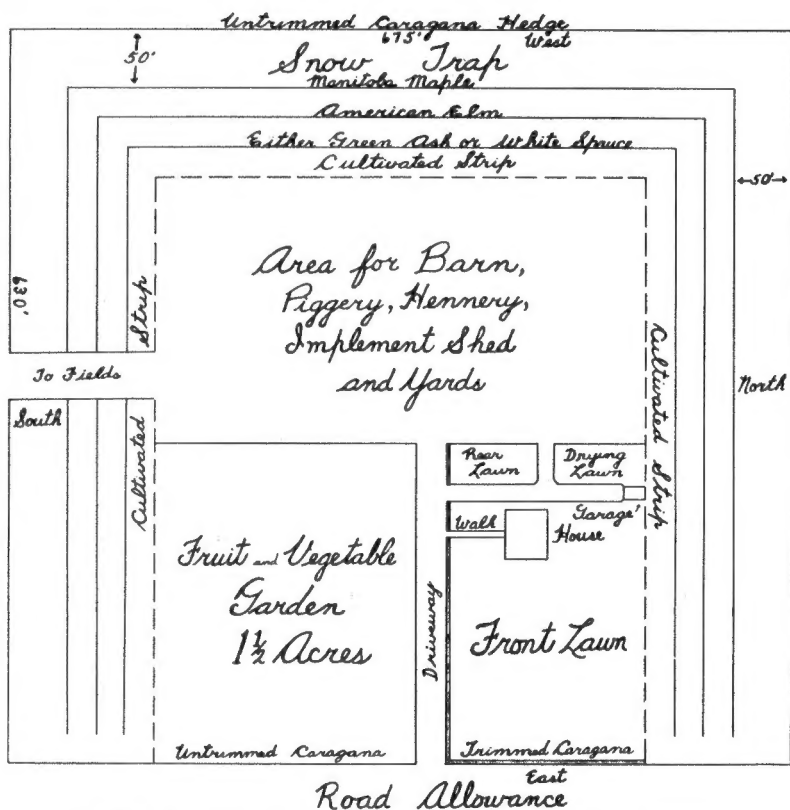


FIGURE 1.—PLAN OF FARMSTEAD WITH SHELTER AND GARDEN

The area to be used in the growing of vegetables and fruits should be well protected on the north, west and south sides at least, and should be conveniently located. This plan provides for a garden area of considerable size within the belt of trees sheltering the buildings, yards and grounds. Protection for the garden is provided on all four sides. Such a lay-out not only does much toward insuring a supply of vegetables and fruits for home use and makes for comfort and convenience, but adds much to the value of a property.

A plan of a farmstead showing a conveniently located and well protected garden area may be found in Figure 1. The total area involved in this plan is ten acres, approximately, and the area allotted to fruits and vegetables is one and one-half acres in extent. This plan is suggested for use merely as a basis in planning a farmstead with a garden area to suit one's special needs and is not to be regarded as a model. The plan is drawn to scale and the scale is approximately one inch to one hundred and seventy feet. Trees of kinds other than those suggested might be used to advantage in certain cases. Willows might be used in low-lying areas where the soil was too moist for the trees suggested. The three rows in the main part of the belt might be increased to four rows or even to five rows where greater width in the main belt was considered desirable. In any case, a strip, at least twenty feet in width, inside the innermost row should be cultivated and kept free of weeds throughout the life of the plantation. Much difference of opinion exists as to what are the proper spacings for trees in a shelter-belt, but the author favors wide spacings. The distance between the rows might be made twenty to twenty-five feet and between the trees in the row eight to twelve feet.

While the presence of effective shelter when the first fruits are planted is desirable, the planting of the fruits need not be delayed because of the absence of shelter. The fruit plants and the trees to constitute the shelter in later years may be planted at the same time. During the years when the trees in the shelter are developing to an effective size, temporary shelter in the form of double rows of sunflowers, at intervals of fifteen to twenty-five feet, may be used for the fruit plants. These rows should run north and south preferably. The heads should be removed in the fall and the stalks left standing during the winter. The use of sunflowers as protection for fruits should not be regarded as a permanent plan, but should be an emergency measure only.

PREPARATION OF SOIL FOR THE FRUIT GARDEN

Summerfallowing the area for one year, at least, before any planting is to be done is recommended. If the land is weedy, summerfallowing for two years may be desirable, especially where strawberries and raspberries are to be grown.

IMPORTANCE OF VARIETY

If the fruit plantation is to be a success, variety must be given due consideration when the selection of stock is being made. Certain varieties are suitable for use in this Province, while other varieties are unsuitable. Extreme hardiness in the plant is a prime essential and if the plant lacks the necessary hardiness, other qualities matter not. Productiveness of plant and quality in the fruit both are desirable in a variety and the varieties to be chosen should not only possess the necessary hardiness but should yield well and produce as fine fruit as can be obtained from hardy plants.

To be a success, a fruit plantation must have sufficient variety to insure fruitfulness. The setting of fruit in our common fruit plants is dependent upon the fertilization of the flowers. Flowers that are not fertilized will not set fruit. The pollen, which is produced by the stamens, or the male organs of the flower, produces the element that effects the fertilization of the ovary and this pollen is normally transferred from the stamens to the pistils, or the female organs of the flower, by insects. In the red raspberry, in most strawberries and in the gooseberry, any variety planted alone should be fruitful. Pollen of a given variety, in such cases, will result in the fertilization of the flowers of plants of the same variety. In the apple, crabapple, plum and cherry, on the other hand, varieties are usually self-sterile or self-unfruitful. Pollen of a given variety, in these

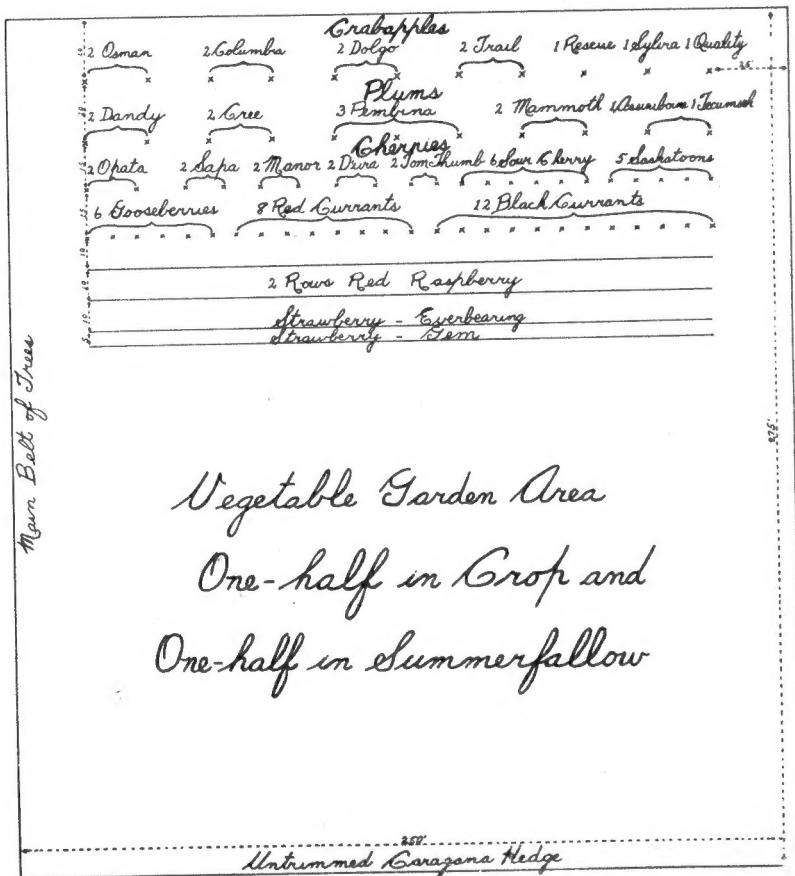


FIGURE 2.—A PRACTICABLE PLAN FOR FARM FRUIT GARDEN

cases, will not result in the fertilization of flowers of the same variety. To fertilize the flowers of a given variety, and to induce a set of fruit, pollen from another variety of the same kind of fruit is required. At least two varieties of crabapples should be planted where crabapples are to be grown; at least two varieties of plums should be planted where plums are to be grown; and at least two varieties of cherries should be planted where cherries are to be grown. Two varieties may not insure a set of fruit every year, and the use of three or four varieties is recommended. For instance, the planting of one tree each of four varieties of plums would be preferable to the planting of two trees each of two varieties of plums. In the crabapple and the cherry also this is true. Currants are only partially self-fruitful, in some cases at least, and not less than two varieties of black currants should be planted where black currants are to be grown and not less than two varieties of red and white currants should be planted where these are to be grown.

BUDDED OR GRAFTED PLANTS VERSUS SEEDLINGS

Nurserymen often offer seedlings, as well as budded or grafted plants, of named varieties of tree fruits. The intending purchaser of fruit plants should bear in mind that budded or grafted plants of Osman crabapple, for instance, will produce Osman crabapples, while seedlings of the Osman crabapple will not produce Osman crabapples. No two of such seedlings are likely to be similar and not one of such seedlings is likely to resemble the Osman parent. All the seedlings of Osman are likely to be inferior to Osman. Seedlings are cheaper than either budded or grafted plants and one may be tempted to purchase and to plant them, but the use of seedling stock is usually accompanied with disappointment and should be discouraged. If, however, the chief purposes of the trees to be grown are for protection and ornamentation, seedlings would be reasonably serviceable and may be used.

WHEN TO PLANT

Spring is considered to be the best time for the planting of fruits in this Province. Early spring planting, as soon as the soil is dry enough to work, is desirable for all the fruits grown in this region, excepting the strawberry, which should not be planted until May. Autumn planting is likely to be less satisfactory than spring planting and should be practised only where spring planting is not possible. In this case, plants of the strawberry should be planted early in September. Plants of the other fruits should be defoliated, if the leaves have not already fallen off, and planted during the last two weeks of September or during the first week in October, at the latest.

WHEN TO OBTAIN PLANTS

The best time to obtain fruit plants, with the exception of those of the strawberry, is in the fall. Where the planting is to be done in the spring, plants of the strawberry should arrive early in May, while plants of the other fruits to be grown should arrive during the latter half of October. Plants in the latter group should be ordered early in the fall and request should be made that delivery take place before winter is likely to set in. Delivery of such plants may take place in the spring, but spring delivery is often less satisfactory than fall delivery and should be avoided when possible. Where fall planting in the fruits other than the strawberry is to be practiced delivery of the plants should take place just before planting.

SOURCES OF PLANTS

Ordinarily fruit plants are obtainable only from persons making a business of growing nursery stock for sale and who are known as nurserymen. The plants required should be obtained from a nurseryman with a good reputation and who is able to supply the stock desired. It is good policy to obtain the plants required as near home as possible, though one need have no hesitation in ordering from distant points when this becomes necessary. When obtaining budded or grafted plants from distant points one should make certain that the root-stocks are sufficiently hardy to survive the winters in the region in which the plants are to be grown.

TREATMENT OF PLANTS UPON ARRIVAL

As soon as possible after their arrival from the nurseryman, plants should be unpacked and their roots plunged in water. Where the nursery stock has been shipped a short distance only, and where careful packing has been practiced, it is unnecessary in most cases to leave the roots immersed more than an hour or two. Where the roots are dry, on the other hand, and where the plants appear to have suffered from lack of

moisture in transit, the immersion treatment should be continued for at least twenty-four hours. If the bark of the stems of woody plants has shrivelled, as sometimes happens when the stock has been poorly packed, the stems, too, should be submerged in and kept under water for a twenty-four-hour period. In extreme cases these periods might be extended.

Where delivery late in the autumn has taken place the plants should be either heeled-in or buried in soil out-of-doors immediately after being taken from the water. A trench nine to twelve inches deep and two feet in width, with one side making a vertical line and the other a long slope, is dug and the plants are placed crosswise in this trench. The roots are placed on the deep side of the trench and the stems rest on the sloping side. The plants should be placed singly in this trench and so spread that the soil will come in contact with their roots readily. The trench is then filled with moist soil and this soil is firmed. If it is practicable to do so, water should be applied freely after the roots have been covered and before the trench has been filled. Water applied in this way settles the soil and brings it in close contact with the roots. In this case the trench is filled immediately after the water soaks away. Merely filling the trench with moist soil and firming this soil about the roots results in a covering for the roots and the lower parts of the stems and this may be sufficient in most cases. Banking the soil over the plants and covering the upper parts completely, to a depth of three or four inches, may be desirable in some cases, but this should be delayed until winter is about to set in.



FIGURE 3.—A WELL SHELTERED FRUIT PLANTATION

Good shelter is essential in the successful culture of fruits in Saskatchewan. With good shelter, plants of many varieties of the hardy fruits will thrive and bear good crops of delicious fruit.

In the case of spring delivery of the stock, the planting should be done immediately after the plants have been removed from the vessel containing water. If, however, this is not possible or if it is not convenient to do so immediately, the plants should be heeled-in well in moist soil to await being planted. The roots and at least two-thirds of the parts above ground, in the case of woody plants, are covered with moist soil. Sufficient soil is used to prevent the plants from becoming dry, but a great depth is not necessary. After the trench has been filled, a thorough watering is given to settle the soil and to bring it in close contact with the roots. Plants of the strawberry, too, may be heeled-in, but a shady place should be selected for them, and their crowns must not be buried. The leaf surface should be reduced and a thorough watering given. Attention should be drawn to the fact that heeling-in plants in this way is only an emergency measure and should not be resorted to except where necessary. Plants may be held for two or three weeks or more in this condition where delivery is made early in the spring, but the planting should be done as soon as possible after the plants arrive.

SETTING THE PLANTS

The roots of plants are sensitive to drying and must not be allowed to dry during the planting operation. Where only a few plants are to be planted, the wrapping of the plants in wet burlap and withdrawing one plant at a time as needed for planting may be satisfactory. A better plan may be that of using a large pail or tub containing water and keeping the roots submerged while the holes are being prepared for the plants.

The holes to receive the plants should be made just before the planting is to be done. Where deep holes are required, and where the good soil is shallow, the surface soil and the subsoil should be kept separate. These holes should be sufficiently deep to permit the use of a few inches of surface soil below the plant and to permit the setting of the plants from one inch to two inches deeper than they stood formerly. The diameter of the hole should be such as will permit the spreading of the roots of the plant to be set. For a one-year-old apple or plum tree a hole from eighteen to twenty-four inches in diameter and from nine to twelve inches deep should be satisfactory in most cases.

In order that the plant may grow, the plant's roots should be in close contact with the soil. To absorb moisture and the necessary elements from the soil in quantities, the roots are supplied with root hairs. To obtain these materials these hairs must be in close contact with fine soil particles. Very fine surface soil should, therefore, be worked in around the roots to fill all cavities. Where trees and shrubs are being planted, great care should be exercised to fill the cavity that is likely to remain below the crown or the point where the roots and the stem meet. The soil should be thoroughly firmed and no large air spaces should remain. In all cases surface soil should be used to cover the roots. After the roots have been well covered, and before the hole has been filled with soil, a thorough watering should be given where possible. If the soil is inclined to be dry, it is very necessary to use water and to use it freely. Water applied at this time not only moistens well the soil around the roots, but it settles the soil and brings it in close contact with the roots of the plants at all points. A second watering can often be given to advantage. It is important, as already stated, to fill the cavities around the roots and the free use of water is one of the most effective methods of accomplishing this end. After the water has disappeared from the hole, soil should be added but the firmed of this soil should be avoided. The surface soil should be left loose to serve as a mulch, and a slight depression should remain around the plant when the operation has been completed.

PRUNING AT PLANTING TIME

Most fruit plants require pruning at planting time. This can usually be given to advantage after the plants have been set, but it should not be delayed. This pruning is an aid in developing the type of plant desired and is an aid in establishing the plant in its new location. Cutting back induces branching below the point at which the cut is made and a plant with a long stem can thus be made to branch near the ground. An established plant maintains a balance between its roots and its top. In the transplanting process, much of the root system is left behind and this balance between root and top is upset. The untreated transplanted plant may have as little as ten percent of its former root system and its entire top. Heavy pruning of the top will, therefore, do much toward restoring the balance between the part below ground and the part above ground in the newly transplanted plant.

TOOLS FOR PRUNING

The pruning should be done with a sharp tool and a clean cut should be made. For stems up to one-half inch in diameter, a secateur, a small pruning-shear operated with one hand, may be used and for larger stems a fine-toothed saw is satisfactory. The cut should be made in such a direction that water will drain off the surface and not be a source of danger to the exposed tissues. The surface of the cut should be made as smooth as possible.

TREATMENT OF WOUNDS

Wounds made in pruning back a newly planted tree and large wounds made in the removal of branches should be coated with an agent to prevent undue drying of the exposed inner tissues. A moderately soft grafting wax is excellent for this purpose. Melted parawax applied hot with a brush makes a reasonably satisfactory covering for such wounds. The treatment should be given immediately after the pruning has been done.

PROTECTION OF FRUIT PLANTS AGAINST RABBITS

The most effective measure against rabbits is that of fencing the fruit plantation. A fence six feet in height and of two-inch mesh or less is usually sufficient to protect the plants. This should be well supported by posts not more than ten to twelve feet

apart and preferably by a strand of No. 9 wire strung on top of the posts. Banks of snow that form near the fence and that might permit rabbits to gain entrance to the plantation should be broken down when necessary.

Various agents that are applied to the bark of trees have been tried as repellents against rabbits. Blood, lard, axle-grease, paint, waxes, resins, paper, asphalt, sulphonated oils and other agents have been used. Most of these have some virtue but much is required to repel a hungry rabbit. Some of these agents are harmful to fruit plants and cannot be used safely.

The use of traps has some virtue. Box-traps have been used with success. These may be home-made and are constructed of lumber and wire-netting. When the rabbit enters, the door closes and escape is impossible.

FERTILIZERS AND THE FRUIT GARDEN

While usually of great value in the vegetable and flower garden, fertilizers should be used sparingly in the fruit garden in most parts of Saskatchewan. The purpose of fertilizers is to stimulate plant growth and marked stimulation in the growth of fruit plants frequently results in severe winter injury. Fruit plants over-stimulated by fertilizers are likely to continue growing too late in the season to permit the accomplishment, in due time, of the normal hardening changes in the plant that are necessary if late autumn and winter injury are to be avoided. If the fruit plants make reasonably good growth, without the addition of fertilizer to the soil, the use of fertilizer in such a case may be more harmful than beneficial. Where the fruit plants fail to make normal growth, obviously because of low soil fertility, some fertilizer should be employed. Strawberry plants are less likely to be harmed than woody plants through the use of fertilizer and unless the growth is rank such plants should be benefitted by an application of fertilizer soon after the plants begin to grow in the spring.

The fertilizer used should be one that contains a very moderate amount of nitrogen and a much higher percentage of phosphoric acid. Further, it should be one in which the elements are readily and quickly available to the plant. Ammonium Phosphate (11-48) is probably more suitable than any other fertilizer for use in the fruit garden in this Province. This fertilizer could be applied at rates possibly up to one pound to two hundred square feet of soil surface to be treated. This should be applied soon after the plants begin to grow and should be uniformly distributed over the area occupied by the plants. To be taken up by the roots of the plant the fertilizer must be in solution and the application could be made to an advantage just before a rain or before a watering was to be given. **The use of fertilizer in the Saskatchewan fruit plantation should be considered purely experimental at this time.**

IRRIGATION AND FRUIT GROWING

While irrigation may be of great benefit in a dry climate to horticulture as a whole, special restrictions must be placed on the use of water in the culture of certain plants. Vegetables, flowers and other herbaceous plants usually respond well to irrigation at intervals throughout the season and harmful effects to the plant are seldom observed even when the supply of soil moisture is kept at a relatively high level during the autumn months. Woody plants, on the other hand, usually respond well to generous supplies of soil moisture early in the season but much reduced supplies during the late summer and autumn are usually essential to the well being of the plant.

The normal course followed during the season by a woody plant is that of making most of its growth during the first half of the season and that of maturing its tissues and preparing them for winter during the latter half of the season. Growth in the woody plant usually begins in May, usually reaches its maximum rate in June and in most cases has reached a low ebb by the end of July. At the end of July the plant is tender and is not in condition to resist the cold of winter. During August, September and October the plant must undergo important changes that will fit it for the months of zero weather that lie ahead.

The soil moisture supply is of prime importance in the normal behaviour of the woody plant. A liberal supply of moisture in the soil, during the season when most of the growth is made, is desirable in most cases and this will stimulate growth and will permit the plant to put forth its best effort when other conditions for growth are favorable. Restricted supplies of moisture during the season following that of rapid growth or during August, September and early October, are necessary if the plant is to prepare itself properly for winter. If the soil moisture supply remains high during this period the normal preparations for winter are not likely to be completed and the plant will enter the winter in an immature condition. In such a case, winter injury is almost certain to follow and the amount of injury will be determined in part at least by the degree of immaturity in the plant.

Nearly all the plants classed as fruits and grown in this Province are woody in nature and must be treated as woody plants. Irrigation with fruits should, therefore, be used with caution. In the drier sections of the Province irrigation of fruits in general might be carried on safely probably until the end of July. With raspberries irrigation might be carried on until the first or second week in August. In the sections of the Province where the annual precipitation approaches twenty inches, the use of irrigation for crabapples, plums, cherries, currants and gooseberries may be more harmful than beneficial. If used in such cases, irrigation should be restricted to the early part of the season.

Being a non-woody plant and one that is given winter covering, the strawberry may be irrigated safely later than July. Further, it is less drouth resistant than the other fruits grown and it cannot endure long periods without either rain or irrigation. Irrigation may be carried on safely with this fruit during August and September and even in October if necessary. The plants should never be subjected to dry soil conditions and waterings to prevent this may be given at any time during the growing season.

While late summer and early autumn watering for woody fruit plants should be avoided and the moisture supply in the soil during that season kept at a reasonably low level, an abundance of moisture in the soil in which the plants are growing is desirable during the winter months. Such plants lose water from their exposed parts during the winter through vaporization and this must be made up from the supply in the soil if the plant is to escape injury. If the soil contains little moisture the plants may be unable to absorb, through their roots, sufficient water to balance that given off by the parts above the ground and drying out and the killing of the exposed parts of the plant may result. If, on the other hand, the soil contains ample moisture the absorption rate should equal the vaporization rate and injury to the plants from drying out should not occur.

A good irrigation just before winter sets in should, therefore, do much toward insuring against the drying out of the exposed parts of the plant, with the resultant killing, that frequently occurs during the winter months. Sufficient water to moisten the soil well to a depth of eighteen inches might be used to advantage at this time. A smaller amount than this would be beneficial and might prevent injury that would occur if no water were given. One need have no fear that a good watering given just before winter sets in will harm the plant. It is important, however, that the watering be delayed and be given as near the advent of winter as conditions will permit.

HONEYBEES AN AID IN FRUIT-GROWING

While fruits can usually be grown successfully without the presence of honeybees, these insects are of distinct value as pollenizing agents. Since pollen must be carried from tree to tree in the tree fruits, if fruiting is to take place, carrying agents are necessary. Insects are the only effective pollen carriers in this case. Many insects serve in this capacity and while those other than honeybees are usually present in sufficient numbers to make the required transfer of pollen, there are times when honeybees are necessary to insure a good crop of fruit. Apart from their service in acting as pollenizers, honeybees provide a highly nutritious and palatable food and where sufficient bee pasture is to be found, the keeping of a colony or two of bees is sound economy.

THE APPLE

CLASSES

The apple may be divided, for convenience, into two classes on a basis of the normal size of the fruit produced. These may be designated "Standard" and "Crab." Standard varieties of the apple may be considered those, the fruits of which are at least two inches in diameter. Those, the fruits of which are less than two inches in diameter, may be designated as "Crab" apples. It is true that a variety that is normally a crabapple may produce, under favorable conditions, fruit that is two inches in diameter or more and that a variety that is classed as a standard apple may produce, under unfavorable conditions, fruit less than two inches in diameter; but since these are abnormal and represent extremes, the basis for classification suggested will serve a purpose and may be accepted until a better basis is found.

VARIETIES

Standard Apples.—Standard varieties are not recommended for general culture in Saskatchewan because of the absence in the plant of the necessary hardiness. While a few apples are being produced under special conditions the success attained in the growing of this fruit has not been sufficient to justify the inclusion of standard apples in a list of recommended varieties for this Province. The beginner should plant trees

of the crabapple rather than of the apple and add apples at a later date, if he has the urge to try out such fruit in his plantation. This should be done, however, with the expectation of little return beyond the thrill of picking a few apples produced in a Saskatchewan garden.

A few standard apples suggested for trial in such cases are: **Blushed Calville**, **Hibernal**, **Plotosh x Tetofsky** (frequently listed as **Plotet**), **Wealthy**, **Heyer No. 12**. Blushed Calville and Heyer No. 12 are probably the hardiest in this list. The fruits of all are lacking in quality though those of Wealthy are rated "fair."



FIGURE 4.—FRUITING BRANCHES OF THE SILVIA CRAB

This is one of the earliest ripening varieties of the crabapple grown in Saskatchewan. The fruit is of good quality but it remains in prime condition for a short time only. The harvesting of fruit of this variety must not be delayed long.

Crabapples.—Crabapple varieties that are recommended differ greatly with respect to size and quality of fruit. Certain varieties are recommended for general use while others are recommended for special uses. Varieties recommended for general use are: **Adam**, **Osman**, **Quality**, **Silvia**, **Anaross**, **Amur**, **Columbia**, **Florence**, **Garnet Saska** and **Robin**. The first five only may be eaten out of the hand with relish. All are satisfactory for sauce, preserves and jelly. Fruit of Silvia matures early in August and remains in prime condition for a few days only. An outstanding jelly crab is **Doigo**. The fruit of this is deep crimson when ripe and the jelly resulting has not only fine flavor but a depth of color found in jelly from few crabs. Where a crab purely for ornamental purposes is desired, a red-fruited form of the **Siberian** crab is recommended. The tree is hardy and though small, the fruits are very colorful and are borne in large numbers. The variety **Hopa** is a red-flowered crab with small red-fleshed fruits that is grown as an ornamental. The plant is lacking somewhat in hardiness though it persists for many years and makes a great show during the blooming period.

Three large-fruited crabapples that are not fully hardy but that are doing moderately well and that are bearing considerable fruit in certain gardens are: **Trall**, **Rosilda** and **Jewel x Rideau**. The fruits of these are of good quality and are superior to the fruits of those listed above and also to the fruits of the standard apples suggested for trial. While not as large-fruited as the standard varieties in question these crabapples should be included in the fruit plantation before standard varieties. These varieties are recommended for trial in plantations containing recommended varieties of crabapples and where light or very moderate crops of high class fruit will satisfy. Yields of over one hundred pounds of fruit have been harvested from trees of these varieties growing in the University plantation.

One of the larger fruited crabapples of which mention is frequently made is **Rescue**. This variety is promising and is giving fair yields in certain plantations but is not so in others. The fruit is of good quality but the tree is often a poor bearer. It is one that might be planted for trial.

NUMBER OF VARIETIES TO GROW

At least four of the recommended varieties of crabapples should be represented in the fruit plantation. Plants of each of these can be depended upon to supply pollen to meet the needs of the plants of the other varieties planted. Plants of varieties recommended for trial or suggested for trial should not be depended upon as a source of pollen for other varieties. Plants of these will accept pollen from plants of recommended crabapples, however, and plants of the recommended crabapples can be depended upon as a source of pollen for the trees of any apple variety to be grown.

NUMBER OF TREES TO GROW

Eight to twelve trees of crabapples are not too many for a farm garden. This group might consist of two trees each of four to six varieties. In small gardens fewer trees would be required and in such cases one tree of each variety to be used would probably be ample to provide the group to be accommodated.

PLANTS FOR PLANTING

For most purposes either budded or grafted plants should be used. Budded plants are preferable to grafted plants. Budded plants, one year from the bud, are desirable and such plants should be strong, well rooted, with a stem at least four feet in length and with a Siberian crabapple seedling as the root-stock. Seedlings may be planted where the chief purpose of the plants is to be ornamentation or where the grower is desirous of observing the variety to be found in such plants. In such cases the grower should understand that only very infrequently is a worthwhile seedling found.

PLANTING

Trees of the apple should be planted at least twenty feet apart each way in the farm garden. In dry areas spacings of twenty-five to thirty feet might well be employed. In a small garden area, where closer planting becomes necessary, spacings of twelve to fifteen feet may be used. In a farm garden, the apple trees should be at least thirty feet from the shelter belt. The planting should be done as early in the spring as the condition of the soil will permit. Planting before the end of April is recommended. Fall planting is less dependable than spring planting and should be adopted only where spring planting is not practicable.

DETAILS OF THE PLANTING OPERATION

See introductory section of this publication.

TREATMENT IMMEDIATELY AFTER PLANTING

Immediately after being planted the tree should be cut back severely. The main stem, in an unbranched tree, should be cut back to within eight to ten inches of the ground level. The wounds thus made should be coated at once with either grafting-wax or melted paraffin to prevent the undue drying of the exposed inner tissues. From the base of the main stem, or from the base of the main stem and the bases of the branches, shoots will develop and these will form the framework for the top of the tree.

PRUNING

The following spring before growth begins, the branches produced on the stub the previous year should be thinned out and about five of the strongest allowed to remain. These should be distributed around the stub and should be at different levels. One should be neither directly above nor directly below its neighbor. Each branch left should be cut back to one-third its former length or less.

Pruning in the second spring following that of planting usually consists in cutting back the laterals to about one-half their length. If little growth has been made and these laterals are not more than one foot in length this cutting back need not be so severe.

The additional pruning necessary, in later years, will consist mainly in the thinning of the smaller branches and in the removal of dead and injured wood. Where the branches become too numerous and the central portion of the tree becomes excessively shaded some thinning should be done. The thinning should be done with a view to opening the centre of the tree and to permitting more sunlight to reach that portion. Moderation in this type of pruning is desirable, however. Branches that show killing-back should

be removed a short distance below the base of the visibly injured portion and broken branches should be cut back to sound wood.

The pruning required should be done at the proper times. That necessary in the training of trees, such as the thinning of branches and the cutting-back of sound branches, should be done in the spring, before growth begins. The removal of portions that have been killed during the winter must be delayed until after leafing-out has occurred, but it should not be delayed longer than is necessary. Broken branches may be removed at any time during the growing season.

The best tools for such pruning are a fine-tooth saw and a pair of small hand shears. The shears are very satisfactory for cutting branches of very small diameter and the saw may be used effectively on the larger branches.



FIGURE 5.—BUDDING IS A NECESSARY OPERATION IN FRUIT GROWING

Tree fruits are usually propagated by budding. In this operation, a bud of the named variety to be propagated is applied to the stem of a seedling near the ground level. From the bud thus applied a shoot develops and this shoot becomes the top or the fruit bearing part of the new plant. The stem of the seedling on which the bud is placed is removed to make way for the shoot developing from the bud applied.

HARVESTING THE FRUIT

Except in special cases the fruit of the apple should not be harvested until the seeds have become dark brown. When the seeds have reached this stage the fruit has reached maturity and harvesting should not be delayed long. Fruits of some varieties will remain in good condition on the tree for considerable time after reaching maturity and will permit a delay in harvesting, but in some varieties even a short delay will result in marked deterioration in the fruit. The development of mealiness in the flesh is frequently a prominent characteristic in fruit that has thus suffered. Harvesting may take place before the seeds have fully darkened but early harvesting is usually at the expense of quality. Where the fruit is to be used in the making of jelly, however, harvesting slightly prematurely may be desirable.

Removal of the fruit may be accomplished either by pulling or through the use of shears. Either method is satisfactory provided the spurs remain unharmed. Since much of the fruit is borne on spurs, and, since these spurs frequently carry buds that will give rise to flowers the following year, it is important that the fruit be removed without injury to these parts. The use of shears usually lengthens the operation of harvesting the fruit but it minimizes the injury to the plant. Where the amount of fruit to be harvested is not large and where pulling results in damage to the spurs, shears should be employed. Ordinary scissors of fair size are very satisfactory and are more easily manipulated among the branches than larger shears.

PESTS

Canker-Worms.—This is a small greenish or light brownish or almost black worm that is capable of suspending itself from a leaf or sprig with a delicate silken thread. It feeds on the foliage and often completely defoliates the plant. The Manitoba Maple is very subject to attacks by this pest, but the apple, too, frequently suffers defoliation through its depredations.

The pest responds to treatment of the trees infested with a good arsenical. Either lead arsenate or calcium arsenate is desirable. These may be applied either as a dust or as a spray. If a dust is to be used, mixing the agent with flour or air-slaked lime to the extent of fifteen to twenty times its bulk is practicable and is an economy measure. If a spray is to be employed, the agent should be used at the rate of one pound to twenty gallons of water and the spray kept agitated while the application is being given.

Where only a few trees are to be treated, dusting is practicable. The dust to be used, and prepared as recommended in the paragraph above, may be placed in a small muslin bag and this bag may be tied to the end of a long pole and shaken over the branches to be treated. The use of a ladder in conjunction with the pole might be necessary in some cases. The dusting should be done preferably early in the morning or in the evening when the leaves are moist. A gentle wind would be advantageous in some cases in distributing the dust. The operator should wear a moist sponge over his mouth and nose to prevent inhalation of some of the dust.

For the treatment of many trees, the use of a spray may be more practicable than the application of a dust. A good barrel-sprayer operated with a heavy hand pump is recommended. This sprayer must be provided with a long hose, an extension-rod and a good nozzle or a cluster of good nozzles if the treatment is to be effective. The spraying may be done any time during the day, but a calm day is preferable to one with much air movement.

Tent Caterpillars.—Control for this pest is outlined under the gooseberry.

DISEASES

Fire-blight.—This disease is caused by a definite organism and may attack any part of the tree above ground. Much of the infection takes place through the flowers and insects are responsible in no small measure for its spread. It is most easily recognized on the twigs, where the blighted portions appear as though they had been scorched by fire. At first, wilting of the twigs affected occurs and, later, the foliage on these becomes dry and shrivelled. The bark shrinks and the diameter of the affected twig or branch is lessened. On the larger limbs, cankers appear and a gummy substance is found oozing from openings in these. The disease works down the twigs and branches, killing the affected parts as it goes and, if permitted to continue, it may kill the tree.

Control of this disease is effected easily through the use of resistant varieties. Varieties differ greatly with respect to their resistance to this disease, some being wholly resistant and others with apparently no resistance. The varieties recommended above have shown either very little or no susceptibility to the disease and only varieties with such resistance should be planted.

Where varieties susceptible to this disease are being grown, the removal of the blighted portions is the only known practicable remedy. If the variety is very susceptible, as in the cases of Transcendent, Charles and Jewel, and where the disease has made much progress, the removal and the destruction of the tree are recommended. Where control without destruction of the plant is to be attempted the diseased parts should be removed as soon as possible after discovery. Indication of the progress of the disease is given by the burning of the foliage and by the shrinking of the bark on the parts affected, and removal of the diseased portion is usually assured when the cut is made nine to twelve inches below what is considered the beginning of sound tissue. The cut should be made with sharp shears or with a sharp fine-toothed saw, depending upon the size of the branch being removed, and the wound treated without delay. The portion of the branch removed should be burned at once to prevent the further spread of the disease.

Treatment for the wound consists in wetting the cut surface with a solution of corrosive sublimate in water, one part of the chemical to seven hundred parts of water, and then covering it with melted parawax or some form of grafting-wax. This sterilizes the surface and provides a protective coat for the tissues concerned.

The cutting surface of the pruning-tool, too, should be wet with the solution of corrosive sublimate in water, referred to in the paragraph above, after each cut is made. This destroys any disease organisms on the cutting surface and prevents the possible infection of disease-free tissues when the next cut is being made.

Black-heart.—Black-heart is a very common injury in trees of the apple. It may or may not be associated with the killing-back of branches. The heart-wood and part or nearly all of the sap-wood in the trunk and branches are killed and become darkened. Only a thin layer of living wood encircles this darkened cylinder. Organisms of decay gain entrance sooner or later and attack the dead tissues. Eventually the tree becomes much weakened and either the whole tree or parts of it are broken down by the wind. It usually occurs in varieties lacking in hardiness but may occur in plants of hardy varieties that have not properly matured their wood before winter sets in.

Die-back.—This is another common form of winter injury frequently occurring in plants of apples, crabapples, plums and other fruits. It is characterized by a killing back of the stems or branches to a lesser or greater extent. In some cases only the tips may be killed while in other cases the killing back may extend two or three feet or even more. It occurs in plants that lack the necessary hardiness. It may occur in plants that are inherently too tender for the region in which they are being grown or it may occur in trees that possess sufficient hardiness for the region when proper culture is given but that are lacking in hardiness in a particular case as a result of improper cultural treatment. It is usually associated with Black-heart in the tree fruits but it may occur in plants not affected with this disease.

Control of Black-heart and Die-back.—Since the underlying causes of these two diseases are similar, control measures for one disease are applicable for the control of the other disease. Both are physiological diseases and they are not the result of the attacks of micro-organisms.

These injuries can be prevented or can be kept at a minimum by:

1. Using varieties that possess hardiness in a marked degree.
2. Using plants, where propagation is by budding and grafting, with hardy and otherwise suitable root-stocks.
3. Providing good shelter for the area in which the fruits are to be grown.
4. Providing conditions that will permit only moderate development in the plant each year; that will result in the proper maturity of the wood before winter sets in; and that will give ample soil moisture for the use of the plant during the winter months.
5. Avoiding the giving of late summer and early autumn irrigations and the giving of a late autumn irrigation (shortly before winter is due to set in) where the soil is markedly deficient in moisture in the autumn.
6. Heading woody plants low and keeping the top of the tree as near the ground as is practicable.
7. Thinning the fruit at an early stage in a heavily laden tree (soon after the fruit has set) and avoiding overbearing.

Sun-scald.—Sun-scald is a very common form of winter injury in certain fruits. It usually occurs on trunks and on large branches but it may occur at times on smaller branches. This injury is always found on the side of the trunk or branch most exposed to the sun and on the trunks of trees it occurs on the south side. The area may be three or four feet long, in some cases, and may be several inches in width. The bark on the areas affected is destroyed and after a time it peels off. The wood below is thus left without protection. In time this wood decays and the part of the plant affected is much weakened.

The avoidance of trunks in tree fruits will reduce greatly the amount of this injury and all plants of such fruits should be grown in the bush form. Where trunks are desired for some special purpose, protection against Sun-scald may be effected by the use of sun-shields early in the spring. The parts subject to the injury should be shaded by boards or wrapped loosely with a tough light-colored paper. The use of tar-paper should be avoided as it may, under certain conditions, be responsible for an actual increase in the temperature of the parts that it is protecting and thus result in an increase in the amount of damage from this cause.

Plants showing Sun-scald injury should receive treatment. All bark on sun-scalded areas should be removed and the wood exposed coated with a preservative. Coal-tar is an excellent preservative and this may be applied to all the area excepting the edges near the living bark. Since this compound is destructive to living tissues, some preservative that is harmless to such tissues, such as grafting-wax or a good grade of paint, should be used at the margin of the area. White lead paint has fair preserving qualities and may be used for the entire area where coal-tar is not available.

Chlorosis.—This is another physiological disease but is not related in any way to tenderness in the plant. It is characterized by the absence of the normal amount of

green coloring matter (chlorophyll) in the leaves of the plant. The larger veins of the leaf are likely to be of a normal dark green color but the leaf tissue between these veins is paler than usual. This tissue may be only slightly pale in color, departing from the normal green in small measure, or it may be almost cream with only a trace of green present. In most cases in this climate it is the result of a deficiency of iron in the plant. In order to manufacture chlorophyll, the plant must have a supply of iron and when the necessary iron is wanting a chlorotic condition in the leaves is found. It is a condition that is not uncommon in plants growing in soils that are high in lime. Our soils contain iron in amounts adequate for the needs of plants but certain plants experience difficulty in obtaining from the soil the supply required for normal development. Plants of crab-apples, pears, plums, certain cherries and the red raspberry and also certain ornamentals all are subject to this disease. Plants suffering from this condition cannot develop normally and usually bear little or no fruit.

Control of this condition in the Prairie Provinces and in certain of the Western States presents a problem. If the soil in which the plants are growing could be acidified readily the problem could be solved quickly. The large amounts of lime in nearly all the Saskatchewan soils in which gardening is carried on make acidification impracticable. The addition of iron in soluble form to the soil does not result in the response one might expect, as the iron soon becomes tied up chemically with the lime.

Considerable work on this problem has been done but little progress has been made. The development of resistant materials through breeding offers possibilities and it is probable that the greatest progress will be made in this direction. Certain treatments have afforded temporary relief in some cases and these treatments may be employed until more information is available.

Repeated spraying of the affected plants with a ferrous sulphate solution made by dissolving one and one-half ounces of the chemical in one imperial gallon of water, has been beneficial. The application of ferrous sulphate to the soil in large quantities has been effective in some cases.

An old remedy that has some virtue might be tried on trees suffering from this disorder. Two-inch or two and one-half inch nails, in considerable numbers, are driven into the trunk or large branches of the tree. This may be done in the spring or early in the summer. From the nails the tree is able to absorb appreciable amounts of iron and in some cases the amounts absorbed are sufficiently large to relieve the condition. Response may not be visible for six months or a year after the treatment is given.

THE PLUM

CLASSES

The true plums grown in Saskatchewan fall naturally into two general classes. One class consists of varieties derived directly from species that are native to Western Canada, while the other class consists of varieties that are hybrids between native plums and imported species. The plants of varieties of the former class are usually hardy and while they may be of good size the fruits are not of high quality. The quality is such, however, that the plums are palatable to eat out of the hand and make good jam. The plants of varieties of the latter class (hybrid plums) are often lacking in extreme hardiness but their fruits, in many cases, are large and of good quality. The killing back often resulting in trees of hybrid plums may not be sufficiently serious to prevent the bearing of a fair crop of fruit in certain years, at least, and certain varieties in this class can be grown with assurance of a worthwhile return.

VARIETIES

Native.—A number of very fair varieties have been derived from our native plums. These are mainly selections that have been made from seedlings of wild plums and have been selected and named because of some distinctive characteristic or characteristics, such as superior size of fruit or superior quality of fruit. A few of these varieties that are recommended are as follows: **Dandy**, **Assiniboine**, **Mammoth**, **McRobert**, **Olson**, **Aitkin**. Two new varieties, known as **Bounty**, and **Norther**, are being recommended in certain quarters, but they have not been tested in Saskatchewan sufficiently long to permit their being recommended for general use in this Province.

Hybrids.—The hybrid varieties recommended are as follows: **Pembina**.—This is a large plum of good quality and the plant possesses a good deal of hardiness and is capable of bearing a fair crop of fruit; it is placed at the top of the list of hybrid plums. **Greene**.—This is a medium-sized plum of very fair quality and the tree has a little more hardiness and is more fruitful than that of Pembina. **Objibwa**.—The plant of this variety is not a heavy bearer but the medium-size fruit produced is of good quality. Four varieties

that are less hardy than Pembina and Cree but that produce large fruits of good quality are **Waneta**, **Underwood**, **Tokata** and **Tecumseh**. The fruits of Waneta may reach two inches in length while those of Tecumseh, Tokata and Underwood may exceed one and one-half inches. Tecumseh is early maturing; Underwood and Tokata are mid-season; and Waneta is mid-season to late. The yields that may be expected from plants of these varieties are not high, but where greater variety in hybrid plums than that offered by Pembina and Cree is desired, and where light yields of high quality fruit would be acceptable, these varieties might be tried. Another variety, which appears to be in the hybrid class, and one that should be given a place in a test plot, is **Mordel**. The plant has not been a heavy fruiter at the University but the fruit is very acceptable. For the southern parts of the Province a hybrid variety known as Winona is well worthy of trial. The fruit of this variety is later in maturing than that of any other variety referred to above, but it resists frost well and has always matured in ample time at the University. The plant is a good fruiter and while of medium size only, the fruit is of good quality. Of the various hybrid plums represented in the University plantation Winona has given the greatest yields.



FIGURE 6.—PLUM TREES AT BLOSSOM TIME

Plum trees that have reached the fruiting stage usually flower freely. Even when only a small percentage of the flowers sets fruit the trees may bear a good crop. Most varieties of hardy tree fruits are self-sterile and trees of three varieties or more of the same kind of fruit should be in the plantation.

CLASSES TO GROW

While hybrid varieties have a greater appeal than native varieties, the intending grower of plums should not overlook the fact that the pollen produced by plants of hybrid varieties has little value and that native varieties must be depended upon to supply the plum pollen required in the plum plantation. Plants of varieties of native plums are essential, therefore, and must be included. One might well use varieties of both classes to make up a collection of plums for the plantation. The varieties Dandy, Mammoth and Assiniboine might make up the native group and the varieties Pembina, Cree and Tecumseh might represent the hybrid group. Such a collection of plums would provide ample variety to meet one's needs, in most cases, and would insure reasonably well the fruitfulness of the plants employed.

Seedlings should not be included in the plum plantation. The fruits of these are likely to be inferior to fruits of named varieties and named varieties are no more difficult to grow than seedlings. Even though the first cost is considerably less with seedlings than with plants of named varieties, the beginner should not make the mistake of planting trees that will produce inferior fruit. Seedlings of plums may be used in an untrimmed hedge, however, where the chief consideration is protection against wind.

NUMBER OF TREES TO PLANT

Eight to twelve trees should provide sufficient plums to meet the needs of most families. These could be made up by using two trees each of the three native varieties and two each of the hybrid varieties suggested in the paragraph above. If additional trees were desired, three trees each of the hybrid varieties might be employed or other varieties might be added.

PLANTS FOR PLANTING

Strong one-year old plants (one year from the bud) that have been grown from buds placed on seedlings of native plum are recommended. One-year old plants are usually more easily handled than older plants and the mortality resulting is likely to be lower in the younger plants than in the older plants.

PLANTING

The planting should be done early in the spring. Spacings of fifteen to eighteen feet are ample in most cases, but where the moisture supply is likely to be short, spacings of twenty to twenty-five feet might be employed. The usual care in planting trees, and that outlined in the first section of this publication, should be exercised.

PRUNING AND TRAINING

Like those of the apple, plants of the plum should be grown in the bush form. One-year old plants are usually mere whips without branches. Older plants supplied by nurserymen usually have a clean stem for a distance of three feet approximately, and the branches arise from the stem above this point. In both cases, the plants should be cut back to within eight to ten inches of the ground-level at the time of planting. It is well to delay the operation until just after the tree has been set. Such treatment induces branching close to the ground, and results in the formation of a bush type of plant. The cut should be made at an angle with the earth's surface and should be covered at once with wax. Grafting-wax is desirable for this purpose, but melted paraffin may be used if the former is not available.

One year later the branches produced the first season should be thinned if necessary and only five left to form the main framework of the tree. Those remaining should be the sturdiest of those produced and they should be as uniformly distributed as possible over the short section of stem left at planting time. These five branches should be cut back to one-third their length at this time, to induce further branching and the production of laterals.

Little further pruning is necessary. At the end of the second year—two years from the time of planting—the laterals produced during the second season should be cut back about half-way to induce the formation of sub-laterals. Beyond this the only pruning necessary in the majority of cases, is that required for the removal of dead and damaged branches. When they become unduly crowded, however, the branches should be thinned. Those running toward the centre of the tree or those crossing the central section of the tree may either be thinned or removed.

The pruning should be done in the spring. While it may be done any time after the frost leaves the branches, pruning can be done to the greatest advantage just before growth begins. Branches broken during the growing season or during the autumn should be removed at once.

GENERAL CARE

Plum trees often send up shoots from their roots. These may appear near the base of the tree or at a distance of ten feet or more from the tree. Since they arise from the roots of the tree, these shoots are not of the named variety and are without special value. If left, they will compete with the parent tree and may eventually interfere seriously with the normal functioning of the branches of the tree.

HARVESTING THE FRUIT

Harvesting should be delayed until the fruit reaches a reasonable degree of maturity. If harvested too early, the fruit will not possess its normal quality and if the harvesting is delayed too long much of the fruit may drop to the ground and suffer injury. The harvesting should be done after the fruit is well colored but before the flesh yields readily to slight pressure.

DISEASES

Plum Pockets.—While not very common in the Prairie Provinces, this disease occurs in certain localities. When present, it frequently destroys a large percentage of the plum crop. It may be recognized soon after the fruit has set and fruits affected become very large, hollow and bladder-like and are without the customary pits. When first affected, fruit is yellowish in color, but later it becomes whitish.

For the control of this disease, one spraying with water-soluble lime-sulphur, one pound to four gallons of water, should be effective. This must be given before the buds open in the spring and the most suitable time is shortly before the opening occurs. Every part of the twigs, branches and trunk should be wet thoroughly with the spray. Since the organism causing the disease winters over in the form of spores on or between the bud-scales, the spray must reach every bud if the measure is to be effective.

Black Knot.—The disease is characterized by somewhat spindle-shaped, knotty swellings on the twigs. In some cases these completely surround the twig attacked, while in other cases they are confined chiefly to one side. At first the growths are small and the surface remains unbroken but these increase in size as time goes on, and the surface becomes cracked. Early in the season they are somewhat greenish in color but later in the season they become black.



FIGURE 7.—A FRUITING BRANCH OF THE CREE PLUM

Cree is one of the varieties of plum that performs well consistently. The plant has much hardiness and can be depended upon to bear good crops of fruit.

By removing and burning the knots twice a year, once in the autumn and once late in the spring soon after the knots can be seen, one can do much toward eradicating this disease. This should be done not only on the cultivated plants being grown, but also on plants of the native chokecherry growing near by. The cut should be made a few inches below the knot. A spraying, the same as that recommended for Plum Pockets should be given as a second measure for the control of this disease. One spraying is sufficient for both diseases, but thoroughness in making the application is essential to success in their control.

PESTS

Plum Curculio.—This is not a serious pest as yet but it is present and in some Saskatchewan plantations it does considerable damage. The adult is a snout-beetle, a beetle with a very long nose which hangs down and which suggests the trunk of an elephant. The beetle is about one-fifth of an inch long, mottled with black and gray. In feeding the beetles make small holes in the fruit and feed on the flesh. In laying her eggs in the fruit the female makes both a hole and a crescent shape cut. The grubs feed on the developing fruit and infested fruits usually drop to the ground prematurely. Feeding and egg-laying commence soon after the fruit is set.

The standard control measure is that of spraying the plants thoroughly with lead arsenate in water, one ounce of lead arsenate powder to one gallon of water. Two applications are recommended. The first application is given soon after the fruit is set—when the “shuck” (the part of the flower that drops after blooming) falls, and the second application is given ten to twelve days after the first. Thoroughness in making the application is of great importance.

THE CHERRIES

CLASSES OF CHERRIES GROWN IN SASKATCHEWAN

The cherries commonly cultivated in this Province fall naturally into several classes. Only one of these is native to Saskatchewan. This native form is properly known as the **Bessey Cherry**, although it is often called the "Sand" cherry. The plant is a low growing bush and while varying greatly in size, the fruits are usually in the neighborhood of one-half inch in diameter. Selections from this species have been made and named. The Bessey Cherry hybridizes readily with varieties of the Japanese plum and a distinct class of cherries has arisen as a result of combining the characters of these two fruits. The hybrid plants vary greatly in size and their fruits differ greatly in size and in quality. Since both the plants and the fruits bear a greater resemblance to the cherry parent than to the plum parent the varieties in this group are usually referred to as cherries and in this publication will be designated "**hybrid cherries**." This is a valuable group of cherries and these cherries occupy an important place among fruits for culture in this Province. Hardy forms of the **Sour Cherry** are doing well in certain plantations in the Province, but this class of the cherry is of little importance in Saskatchewan fruit growing as yet. The fruits of these forms are smaller and more acid than the fruits of the common commercial varieties of the sour cherry. The **Nanking Cherry**, the fourth and last class of cultivated cherries to be mentioned, gives promise of occupying a place in fruit growing in this Province. The fruits of the Nanking cherry and the fruits of the hardy forms of the sour cherry are similar in size, but the former are less acid than the latter.

The chokecherry and pin cherry, two native cherries, are sometimes grown under cultivation. The fruits of the former are usually black when ripe and the fruits of the latter red. In both cases are the fruits small. Cultivated plants produce larger fruits than do those growing in nature but fruits, even from cultivated plants, are very small as compared with the fruits of the classes commonly cultivated. Notes concerning these may be found on page 37.

The most valuable class of cherries mentioned is the **hybrid** class. The plants of most of the varieties in this class fruit early and heavily and the fruits of selected varieties are of good size and quality. In some cases the fruits reach a diameter of one inch or more and suggest plums rather than cherries.

VARIETIES

A few varieties in the "hybrid" group that can be recommended are as follows: **Tom Thumb**, **Sapa**, **Oka**, **Dura**, **Manor**, **Opata** and **Ruby**. The fruits of the first five are bluish-black when ripe, with deep red flesh. The fruits of Opata have a reddish skin, when ripe, with a greenish flesh. The plant is a strong grower and a heavy fruiter and it does well under a great variety of conditions. Ruby is a red-skinned cherry, smaller in size than the other varieties listed. **Esaptan** has been given some prominence by certain nurserymen but the fruit of this variety is inferior in quality. Compass has been much planted in the past but it is late in ripening and is a shy bearer and is not recommended. **Heaver**, a new variety that has had some favorable comment, should be planted for trial only. Two selections of the Bessey cherry that can be recommended are **Champa** and **Manmoor**. The fruits of these are less desirable in most respects than the fruits of the "hybrids," but may be used to increase variety where a longer list is to be grown. **Coronation** is a new variety of the sour cherry and **Drilea** is a new variety of the Nanking cherry that are under test in Saskatchewan, but present information concerning them does not permit recommending them for culture at this time.

VARIETY AND FRUITFULNESS

All the named varieties listed above, excepting the Coronation cherry, should be considered self-sterile. When planted by themselves plants of self-sterile varieties are unfruitful. Varieties in the Bessey group are inter-fertile and varieties in the hybrid group are inter-fertile. Further, the varieties in the Bessey group are inter-fertile with varieties in the hybrid group. For purposes of selecting varieties to insure fertilization of the flowers, the Bessey group and the "hybrid" group might be considered as one group. At least four varieties from these two groups should be represented in the plantation of cherries. The sour cherries are self-fertile to a considerable degree and plants of one variety possessing the necessary hardiness should be fruitful when planted alone. However, it is advisable to use plants of two or three varieties or seedlings of the hardy sour cherry to insure a supply of suitable pollen. Where plants of Drilea are to be grown, the presence of at least two or three seedlings of the Nanking cherry is required to provide the necessary pollen.

NUMBER OF TREES TO PLANT

Where crabapples and plums are being grown, eight to twelve trees of cherries should be ample for a fruit plantation of ordinary size. Two or three plants each of four of the varieties of the hybrid cherries listed would make a satisfactory collection.

PLANTS FOR PLANTING

Strong, well rooted, one-year old budded plants should be used for the plantation. Seedlings of the Bessey cherry are usually employed as stocks for hybrid cherries, but seedlings of the native plums are considered superior to the former and are often used. Seedlings of Bessey cherry are more easily budded than plum seedlings, however, and this gives the former the preference in budding practice. Named varieties of the Bessey cherry, too, are budded on the stocks mentioned above. Plants of varieties of sour cherries should be on sour cherry seedlings and plants of varieties of the Nanking cherry should be on seedlings of the Nanking cherry.

PLANTING

The planting should be done early in the spring. The spacings recommended range from six feet to fifteen feet. Plants of the Tom Thumb cherry are small and may be set as close as six feet apart in the row. Plants of Oka, Ruby, Sapa, Dura, Manor, Champa and Manmoor should be given eight to ten-foot spacings in the row. Plants of Opata should be set twelve to fifteen feet apart in the row. Plants of the sour cherry and the Nanking cherry should be given spacings in the row of eight to ten feet. Spacings between the rows for all the cherries should be at least fifteen feet and this could be increased to twenty feet, in many cases, to advantage.



FIGURE 8.—CLUSTERS OF FRUIT OF THE OPATA PLUM-CHERRY

This is the best known and the most widely grown variety of the plum-cherry hybrids. The plant reaches a large size for plants of this group and fruits heavily.

PRUNING AND TRAINING

Immediately after being planted, plants of the cherries should be cut back severely. Branching near the ground is desirable and to insure such branching the plants should be cut back to within four to six inches of the bases of the branches or of the ground surface immediately after the planting operation is completed. In the spring of the second year the shoots produced during the first year should be cut back at least half-way to induce further branching. If these shoots are crowded, some thinning should be done. In most cases, five to seven well-distributed branches are sufficient.

Further pruning in the sour and Nanking cherries consists chiefly in cutting out any branches that have been injured or broken. If the bushes become so thick that sunlight is not admitted to the centre, a few of the inside branches should be removed. This pruning should be done early in the spring.

In the Bessey cherries and hybrid cherries more pruning than this is usually necessary if the plants are to continue fruiting well. There is a definite tendency in an unpruned bush of these cherries toward heavy production during the first few years of fruiting, and then a marked falling off in the production of fruit in later years. Most of the fruit in these varieties is produced on one-year old shoots and the plants should be so pruned that goodly numbers of new shoots are produced each year for bearing the fruit the year following. Only vigorous plants produce abundance of such wood and the vigor of a plant can be increased by pruning. Heavy pruning results in the production of an excessive number of shoots, and the pruning done at one time should be moderate in amount. One-third of the branches cut back about half-way or more each spring should be sufficient pruning, under average conditions, to induce the production of the new growth required for consistently heavy bearing in plants of these cherries. Such pruning should be done late in April and in any case should be done before visible growth begins.

THE PEAR

The only pear known at the present time that is sufficiently hardy for all sections of Saskatchewan is one that is native to Northern Asia and that is known as the **Ussurian** or **Siberian Pear**. While slowly growing, the plant is capable of reaching a large size. Considerable variation occurs in seedlings with respect to the hardiness of the plant and the size and quality of fruit produced. On the whole, the fruit is rather poor in quality and its chief use is in the making of pickles. When fully ripe, however, it is palatable. The fruits of some of the seedlings may reach a size of one and one-half to two inches, though in the majority of cases they are somewhat smaller than this. The plants tend to develop slowly and flowering and fruiting seldom occur before the tenth or twelfth year from planting. Spacings for the Siberian pear should be from twenty to twenty-five feet.

No named variety of pear can be recommended for culture in Saskatchewan at the present time. Breeding work is under way and at some future time named varieties, possessing the necessary hardiness and producing fruit of good size and of good quality may be available. Plants of a variety known as **Tait-Dropmore** are being offered by a few nurserymen in the West and anyone desirous of trying a pear of a named variety might try it. Plants of Siberian pear should be planted in such a case to supply the necessary pollen. **Pioneer No. 1** and **Pioneer No. 2** might be planted for trial but these are somewhat less hardy than Tait-Dropmore.

THE APRICOT

The position of the apricot in Saskatchewan is not very unlike that of the pear. A hardy form of this fruit is available in the **Siberian Apricot**, but the fruit of this is not edible. Varieties of an edible fruited species possessing considerable hardiness are available, but those tested in the University plantation have killed back to the snow line year after year. A variety known as **Scout** is reported to be sufficiently hardy to fruit at certain points in Manitoba, but it has not been grown sufficiently long in Saskatchewan to permit the passing of judgment upon it. For the present, at least, the apricot may be considered a fruit not for use in Saskatchewan gardens.

THE PEACH

The peach is classed as a relatively tender fruit and cannot be recommended for culture at this time in any part of the Prairie Provinces. It is interesting to note, however, that three bushes growing at the University of Saskatchewan bore a few fruits in 1941. The fruits were of good size, were white fleshed and of very fair quality. These plants were among a large number grown from pits obtained from a source in Northern Asia.

THE RED RASPBERRY

VARIETIES

Varieties of the red raspberry grown in Saskatchewan might be divided into two classes on a basis of hardiness of the plant. The plants of certain varieties are sufficiently hardy to winter well without a special winter covering, while the plants of other varieties

must be given such a covering, if good wintering is to result. Unfortunately the fruits of the hardier varieties are smaller than the fruits of the less hardy varieties and are somewhat inferior to the latter in quality.

Varieties of the hardier group that are recommended are: **Chief**, **Sunbeam** and **Starlight**. Chief is the most desirable of the three. Plants of it in the University plantation, without special protection, wintered well during the very severe winter of 1942-43 and fruited heavily the following summer. The fruit of this variety is of very fair size and has very fair quality.

A few varieties of the less hardy group that have done well when given winter covering and that have at times given good performance, without special winter covering, following mild winters, are: **Latham**, **Viking** and **Herbert**. Viking is a smooth-cane variety, while the others produce prickly canes. Ordinarily plants of these kill back considerably when special winter covering is not given. A new variety, known as **Taylor**, is outstanding in that the fruits are very large and are of very fine quality. The canes of this variety are rather late in beginning to ripen their fruit and fruiting continues into the autumn. This variety is somewhat less hardy than Viking, Latham and Herbert. However, where the grower is prepared to give the plants extra covering and is desirous of growing some very outstanding fruit, Taylor is a variety that might be grown.

PROPAGATION

The red raspberry is usually propagated by suckers. Suckers are shoots that arise from the roots and in the red raspberry these suckers are produced in great numbers. They appear early during the growing season and by fall they may reach a height of five to seven feet. Varieties differ with respect to the length of cane produced and the height of the sucker depends in part upon the moisture supply. In certain varieties the canes seldom grow taller than three feet. Suckers that are to be used for starting a plantation are either dug in the fall and heeled-in for planting in the spring or are dug at planting time in the spring and are replanted at once. Strong, healthy canes and canes with good root systems are desirable. Canes lacking in vigor and canes showing any indication of dwarfness should be avoided.

SYSTEMS OF CULTURE

Two systems of culture are used in growing the red raspberry. These are known as the "hill" system and the "hedge-row" system. In the hill system the plants are widely spaced and the rows are broken by spaces for facilitating cultivation and harvesting the fruit. In the hedge-row system the canes are usually set closer together and the row becomes continuous like a hedge. Good fruit can be produced by either system but the hill system has advantages over the hedge-row system and is preferred by many growers.

PLANTING

Plants of the red raspberry should be planted in the spring. The usual precautions in planting should be taken, as the roots of the plant of the red raspberry are sensitive to drying.

The spacings recommended depend upon the system of culture to be used and whether or not irrigation is to be practised. In farm gardens and where land is plentiful, spacings of eight feet each way might be employed under the hill system. Five to six-foot spacings in the row might be used, however. For the hedge-row system under such conditions, the rows might be spaced eight feet apart and the plants set three to four feet apart in the row. In the small garden, and where irrigation can be practised, and where the hill system is to be followed, the rows may be spaced four feet apart and the plants spaced four feet apart in the row.

The newly set canes should be cut back immediately after planting. The amount of cutting back will depend upon circumstances. When canes are moved from one part of a plantation to another part and where a ball of earth is moved with the plant, little cutting back is necessary and the plant may do better without any cutting back than with even a small amount. On the other hand, where the canes have been shipped, and especially without soil on the roots, such plants will have a better chance of establishing themselves in their new location if cut back half way or even more. The author has had excellent results cutting the canes back to a level of from two to two and one-half feet above the ground surface and all plantings at the University are treated in this way.

CULTURE

Clean cultivation may be practised throughout the growing season. An alternative treatment is that of mulching the areas between the rows with straw in the spring,

removing this about August 15th and practising clean cultivation during the remainder of the season. The chief purpose of the mulch is to conserve moisture and to keep down weeds and a layer of straw four to six inches in thickness is ample. Under ordinary conditions the mulching treatment is the better. Where irrigation can be practised, clean cultivation should give as good results as mulching.

The excess canes produced by the plants should be destroyed in an early stage. Young tender canes are more easily removed than older woody canes and when the weeding is being done early in the season many of the unnecessary canes can be removed with the hoe with little extra effort. This will lighten the task of pruning after the season of harvest.

FRUITING HABITS

In the red raspberry, the fruit is usually borne only on one-year old canes. Each year new canes or suckers are sent up in large numbers by the roots of established plants. These suckers appear early in the season and continue to grow until autumn. At the end of the growing season, they may be five or six feet or more in height. These canes normally winter over and produce the fruit that the plantation bears the following year. The canes that bear the fruit are thus one year old, and are produced the year previous to that of fruiting. On these canes the fruit is borne on short lateral branches and these laterals appear normally over the greater part of the cane. Those produced at the top and near the base of the cane are usually weak and produce few fruits, while those produced in the middle region and just above it are usually strong and are very fruitful. Immediately after fruiting, the canes die and during the autumn months dead canes will be present in the neglected plantation. During the summer months of any year, therefore, two sets of canes will be found in the raspberry bed. Early in the season the older set will be found producing flowers and these produce the fruit that is harvested late in July and during the early part of August. The other set are the new shoots that have appeared since spring and these will bear fruit the following year. At the time of harvest, the new canes may be taller than the old canes and they may be present in large numbers.

In a few varieties new canes may flower late in the summer or early in the fall and attempt to bear fruit. These canes seldom succeed in ripening fruit in this climate because of the shortness of autumn.

PRUNING

A raspberry plantation should be pruned each year. The pruning should be done in the proper way and should be done at the proper time.

Pruning in the red raspberry consists, therefore, in removing the dead canes and in thinning the new canes where these are too numerous. Raspberry plants may be kept in hills or they may be grown in a hedge-row. In the former case from ten to twelve canes should be left in each hill and in the latter case the canes should stand from nine to twelve inches apart and sufficient left to make a double row. In many cases differences in vigor are noticeable and where such are found, the strongest and the most vigorous canes should remain. Invariably the large canes produce more fruit and larger fruit than do the smaller canes and a careful selection on the basis of size should be made. Where the hill system is followed, pruning consists, therefore, in removing all the dead canes and in reducing the number of living canes in the hill to ten or twelve. These should be distributed over an area from a foot and one-half to two feet in diameter and a space between the hills kept clear to permit the giving of the necessary cultivations. Short stumps are desirable and the canes removed should be cut as close to the ground as possible. Where the hedge-row system is practised all the dead wood is removed and only sufficient of the new canes left to provide a double row with spacings between canes of nine to twelve inches. In both cases attention should be given to alignment and the rows should be kept as straight as possible. If this is done, the plantation will have a more pleasing appearance than it would have otherwise and cultivation may be practised without difficulty.

The best time to prune a plantation of the red raspberry is immediately after the fruiting season. Where the pruning must be delayed the delay should be no longer than is necessary. In no case should it be delayed beyond late autumn.

WINTER PROTECTION

Canes of the varieties in the hardy group require no special winter protection. The canes of varieties that are not fully hardy should have special protection during the winter months. This special winter protection should be given just before winter sets in.

A practise, for the protection of canes of the less hardy varieties, that is moderately satisfactory in some seasons is that of bending the canes down in the direction of the row and covering their tips with earth. A small amount of soil removed from the base of the plant on the side to which the canes are to be bent may insure against breaking the canes in the operation. When treated in this way, the canes are near the ground and their uppermost parts may be below the snow line during the winter months. In the spring, the tips are released and in a short time the canes return to their upright positions.

Another method for protecting canes of tender varieties which involves the use of the minimum amount of labour is that of employing poles to weight the canes that have been bent over and to hold the upper parts of these canes in close contact with the ground. The canes are bent at right angles to the direction of the row and into the space between the rows and the poles rest on the canes a short distance below the tips. Two persons can place these poles to advantage, one person at each end of the pole. This method is satisfactory where heavy falls of snow are experienced early in the winter.

A method that involves the expenditure of more time and labour than the method mentioned above but that gives complete protection to the plants throughout the entire winter is that of covering the canes completely with soil late in the autumn. Just before winter sets in, the canes are bent over in the general direction of the row but a little to one side and are then covered with soil. Soil is added until at least three or four inches of covering protect the canes. A small bank of soil made close to the canes and over which the canes can be bent will prevent possible breakage when the covering is applied. About the end of April, or just before growth begins in the spring, the soil is removed and the canes are allowed to return to their normal positions.

RENEWING THE PLANTATION

A plantation well cared for should last ten or twelve years at least. As soon as the plants begin to weaken and show a falling off in the production of fruit, a new plantation should be started. The old plantation may be destroyed as soon as the plants in the new plantation have become well established and begin fruiting well.

PESTS

Mites on Raspberries.—These are very small mites that may be seen with the naked eye, on close inspection, and that are found on the under-side of the leaf. A delicate silken web is usually present. The pest feeds by piercing the tissue of the leaf and sucking the sap. Infested leaves usually become pale or somewhat greyish in color and when the infestation is heavy they dry up and may drop to the ground. A large percentage of the leaves may be severely injured or destroyed and in such a case the fruit fails to develop normally. The first injury to the foliage may be observed late in May, while the leaves are still small. Infestation is confined largely to the leaves of the canes that have wintered over. When the infestation is heavy, leaves on the new canes usually show some injury toward the end of the summer.

Satisfactory control of this pest presents problems. The pest is found on the under-side of the leaf and it is not easy to reach that surface with a spray. The materials used at the present time in its control in the districts of Ontario where raspberries are grown commercially and that are very effective are available from few sources only in the Prairie Provinces.

A new spray that has been found safe and effective for raspberries in Ontario is "Dimite" and the use of this in the control of this pest is suggested. This should be used according to directions on the container. Applications must be made to the under surface of the leaf and as soon as the pest is found present. A one percent spray of a special summer oil also has given good results in the control of mites on raspberries in Ontario. This is a special oil that mixes with water and is an oil that will not burn the foliage if used according to directions. **Lubricating oil emulsions must not be used for this purpose.**

Certain sulphur sprays have been used with some measure of success and if the materials mentioned above are not available such a spray should be employed. One of these sprays is made by using one ounce of ordinary sulphur ("flowers of sulphur"), two ounces of soap and one gallon of water. The soap is dissolved in a small amount of hot water and this solution is made up with cool water to one gallon. The sulphur is then added and mixed with the soapy water. Since the sulphur will settle in a short time the mixture must be kept agitated while being applied. Application is made when the pest is first observed and it must be applied to the under-side of the leaf.

Raspberry Sawfly.—In the injurious stage this pest is a greenish colored worm with tubercles bearing small spines. The adult is a small black fly. The female fly lays

her eggs in the leaf. The eggs hatch and the larvae or worms feed on the leaves. The larvae are about three-fourths of an inch long when full grown. This pest is present in numbers to do appreciable injury to the plants occasionally only. A heavy infestation may occur one year and the pest may not appear again for some years.

A simple and safe control measure is that of dusting the infested plants with derris. The worms are very sensitive to derris and the use of this agent on the plants even after the fruit is formed, is without danger to the consumer of the fruit.

Raspberry Fruit Worm.—Most of the injury done by this pest is done by the adult which is a small brown beetle. It feeds on the flower buds and also on the young leaves. The larvae which are nearly white in color become full grown about the time the fruit is ripe and are often found lying between the fruit and the receptacle which supports the fruit. The worms often adhere to the fruits. This insect has been present in Saskatchewan raspberry plantations in sufficient numbers to do considerable injury.

Control is effected by either spraying or dusting the plants, as soon as injury is observed with lead arsenate. Dusting is the more convenient method of making the application. For dusting, one part of lead arsenate may be mixed with fifteen parts of flour. The material is placed in a porous bag and this is shaken lightly over the parts to be treated. The application should be made before the flower buds unfold and must not be made after many flowers have opened.

THE BLACK RASPBERRY

Though native to America, the black raspberry has a more restricted range and is less hardy than the red raspberry. In a few Saskatchewan gardens, plants of this fruit are found and where they come through the winter in good condition the canes usually bear well. While the general impression obtains that plants of the black raspberry do not possess sufficient hardiness to be included in the Saskatchewan garden, even outstanding varieties of this fruit can be grown successfully if the plants are given good winter protection. Since the fruit is very pleasing to the taste and makes excellent preserves, plants of the black raspberry might well be found in more fruit plantations in this Province.

VARIETIES

An outstanding variety of this fruit is **Bristol**. The plant is a strong grower and the fruit is large and of excellent quality. The plants are tender, but if well covered they winter well. Plants of a variety known as **Mrs. Heath** have more hardiness than most other varieties, but the fruit is small and is lacking in quality. **Cumberland** and **Plum Farmer** are two varieties, producing fruits above medium size, that are found in a few Saskatchewan fruit plantations.

PLANTING

The plants should be planted early in the spring and should be set at least six feet apart in the row. The newly set plants should be cut back to a level of one and one-half to two feet.

PRUNING

The pruning of a bearing plantation consists in:

1. Cutting off the tips of the new canes when these have reached the height of two to two and one-half feet.
2. Removing the canes that have fruited. This is done immediately after the fruiting season is over.
3. Thinning the new canes. From six to eight canes are sufficient for each hill. This thinning is done after the fruiting season is over.

WINTER PROTECTION

The canes of the better varieties of the black raspberry must have special winter covering and must be well protected against severe cold. The canes should be bent over, as for the canes of the less hardy red raspberries, and covered completely and well with soil. The canes should be covered with at least three or four inches of soil. This covering should be given just before winter sets in. The covering should be removed late in April or during the first week in May.

THE PURPLE CANE RASPBERRY

This class of raspberry is often referred to as the "Purple" raspberry. The canes of this raspberry usually have a purplish tinge and the fruit is purplish-red in color. This raspberry is regarded as a hybrid between the red raspberry and the black raspberry.

The plant is usually a strong grower and in some varieties the canes often reach a height of six to seven or eight feet if left unpruned. The fruit is very flavorful and makes fine preserves. This class of raspberry is similar in hardiness to the black raspberry. Plants of most varieties are tender and may be killed out completely without special protection, but appear to winter well when given good covering. One variety which originated in North Dakota and which is known as **Ruddy** has wintered without special protection year after year at the University of Saskatchewan. The plants have always killed back considerably but the canes are dwarf and have borne fair crops of fruit near the ground.

VARIETIES

Ruddy is the hardiest named variety with which the author is familiar. As stated in the paragraph above, plants of this variety have been sufficiently hardy without special protection to bear fair crops of fruit. The fruit is of medium size only and while it is red in color, it has the flavor typical of purple raspberries. A variety with taller canes and producing larger and finer flavored fruit and that has done well at the University of Saskatchewan is **Potomac**. The plants of this variety are tender but are easily covered for wintering and are very productive. The fruits of this variety too are red rather than purple. Where a fine quality variety is to be grown, **Potomac** is recommended. **Sodus**, another purple variety, has been grown in the University plantation successfully.

PLANTING AND PRUNING

The directions given for planting and pruning the black raspberry apply to the purple raspberry also.

WINTER PROTECTION

Plants of the variety **Ruddy** may be left uncovered. Canes of **Potomac** should be bent over and covered completely with soil as for plants of tender varieties of the black raspberry.

THE STRAWBERRY

The strawberry is one of the fruits grown in Saskatchewan that demands moisture in good supply. Under dry conditions, the plants may survive, but little growth will be made and only small and shrivelled fruit can be expected. With the necessary moisture, plants of certain varieties thrive and bear good crops of large, delicious fruits.

CLASSES

Two classes of strawberries are found in Saskatchewan gardens. One of these is known as the "June-bearing" or "summer-bearing" and the other is known as the "Ever-bearing." Plants of summer-bearing varieties usually begin ripening their fruit late in June and the fruiting season is over before the end of July. Plants of ever-bearing varieties usually begin fruiting about the end of June or early in July and continue fruiting until the heavy frosts of autumn occur. The fruiting period of the former group is short but the plants usually bear heavily during that period. The fruiting period of the later group is long, but lighter yields may be expected during a given period. In summer-bearing varieties most of the fruit is borne during the period when the natural moisture supply is at least fair, while in ever-bearing varieties much of the fruit is borne during the latter part of July and August when the natural moisture supply is usually low.

Where artificial waterings cannot be given and where the natural supply of moisture is not high, summer-bearing varieties are likely to give better results than ever-bearing varieties. Where irrigation can be practised either class can be grown well. In the small irrigated garden, where the fruit is to be used in the fresh condition, an ever-bearing variety should meet the needs well. In the larger irrigated garden, and where much of the product is to be preserved, a summer-bearing variety is desirable.

VARIETIES

The list of varieties, from which one may choose the variety to be grown, is short. In an ever-bearing strawberry, the variety **Gem** is to be recommended. The plant of this variety is a strong grower, is a good plant maker, is hardy and is productive. The fruit is of good size and while it is lacking somewhat in color it has very fine quality. **Gem** appears to outclass other varieties of the ever-bearing type to such an extent that no other variety will be recommended. **Sparta** has appeared recently, and some favorable reports regarding it have been received, but any plantings made of it should be experimental only. **Pixie**, another new variety, has been given publicity but it, too, should be regarded as one that should be planted for trial only. The plants of **Pixie** tend to overbear and consequently the fruits are usually undersize.

The most satisfactory variety in the summer-bearing class appears to be **Senator Dunlap**. While far from being perfect, this variety has done well under good cultural conditions and has given fair crops of delicious fruit of good size. **Dakota**, a smaller fruited variety, has lost much of its earlier popularity mainly because of the smallness of size and the lack of firmness in the fruit. Being hardy, vigorous, a good multiplier and a good fruiter, the plant of this variety is surpassed in few cases, but desirable fruits, as well as desirable plants, are necessary if a variety is to have an abiding place in fruit production. Many other varieties are being grown in a small way, but these cannot be recommended at the present time. All the varieties mentioned above are self-fertile and will fruit when planted alone.

PLANTS FOR THE PLANTATION

Named varieties of the strawberry are usually propagated by runners. Runners are sent out by the parent plant and these produce new plants. The new plants in turn send out runners and additional new plants result. One parent plant may be responsible for the production, in a growing season, of a great many young plants. These new plants are used in starting a plantation.

Plants produced early in the season of the previous year are preferable to those produced later in that season for starting a new plantation. Those produced early in the season are likely to be stronger and better rooted than those produced later and will consequently give better results. Such plants are usually found near the parent plants and show more development than the younger plants.

Plants to be planted in the new plantation should be moved as short a distance as possible. Strawberry plants are not easily moved great distances and when purchases are made from a distant source the mortality may be high. The best source is one's own plantation and this should be used when possible.

SYSTEM OF CULTURE

Two systems of culture are employed in the growing of the strawberry. One is that known as the "hill" and the other the "matted-row." In the hill system the plants are usually set closer than in the matted-row system, and no increase in the number of plants is permitted. All runners are removed in their early stages. The plants set out become very large and are capable of producing many very large berries. In the matted-row system, runners are allowed to develop and a matted row, eighteen to twenty-four inches or more in width, results. The plants, under this plan, do not reach the large size of those under the hill system and produce fruits in smaller numbers and somewhat smaller in size.

For the small garden and where maximum production on a given area is desired, the hill system should be employed. For larger gardens the "matted-row" system is recommended.

PLANTING

Strawberry plants may be transplanted any time between early in May and September 10th, but the earlier the transplanting is done during this period the greater will be the progress made by the plantation during the season. Fall planting may have little advantage over planting early the following spring. The transplanting should be done when moisture conditions in the soil are good.

Where the plants are being moved short distances, an attempt should be made to move a ball of soil with the roots of each plant. The soil must be moist if this is to be accomplished, and the soil taken up with the plant should be slightly firmed around the roots at once with the hands. Firmed, the soil will remain in place, protecting the roots and preserving a close connection between the roots and the soil. The plants are replanted with the ball of soil intact.

The holes to receive the plants may be made with a spade or in some cases with a trowel. The holes should be deep and wide enough to permit the spreading of the roots well where the roots are bare and to accommodate the ball of soil where such soil is moved with the plants.

The plants should be set at the proper level. The best guide as to depth to set the plant is the level at which the plant stood before being moved. This can be seen readily by the color of the crown—that part from which the leaves arise. The part below the ground surface is without green coloring matter, while the part above the ground is green. The crown is usually shallow and may not be deeper than one-half inch. The top of this crown should be on a level with the surface of the soil, and the surface of the soil near the plant should be a little below the general surface of the soil in the area.

Watering the plants at the time of planting is good practise. A slight depression should be left around the plant and this depression may be filled with water two or three times. After the water from the final watering has soaked away the moist surface should be covered lightly with dry soil.

The removal of part of the leaf surface of the newly set plant will often reduce mortality in the transplanting of strawberry plants. One pair of leaves will meet the needs of the plant for the time being and the youngest should remain.

The spacings of the plants at planting time will depend upon the system of culture and the conditions under which the plants are to be grown. With the hill system the plants may be set as close as twelve inches apart in the rows and the rows eighteen inches apart. In the very small garden where irrigation can be practised such spacings are recommended. Where space is more abundant and where the hill system is to be employed, these spacings may be increased to eighteen inches to twenty-four inches in the row and three feet or more between rows. Where the matted-row system is to be employed, the plants are usually set from fifteen to eighteen inches apart in the row and the rows three to five feet apart, depending upon the available moisture supply and the space available.

TREATMENT FOLLOWING PLANTING

Where the hill system is in use, all runners are removed soon after they appear. This prevents the multiplication of plants and the number of plants in the plantation remains the same as it was at the beginning. Not being allowed to produce runners, the plant increases in size and soon possesses a large, vigorous crown that is capable of producing many large fruits. When new plants are required for a new plantation, sufficient runners to produce the necessary plants should be preserved the year before.

Where the matted-row system has been adopted all the runners are allowed to develop. Runners may develop in any direction and the placing of these to keep the row within bounds is often necessary. The width of the row should not be allowed to exceed eighteen inches during the first year and many of the runners produced will require training in the direction of the row. Each new runner-plant should be given a space of six inches each way. Runners often require aid in rooting and this rooting can usually be hastened by partially covering with soil the joint that is to produce a new plant. Keeping the surface of the soil moist will stimulate root production in the runners.

FRUITING HABITS

When planted in the spring, plants of ever-bearing varieties of the strawberry usually bear considerable fruit the same season. Bearing may not begin until mid-summer or even later. While the recommendation that all flowers appearing the first year should be removed and the plants not allowed to fruit is sometimes made, the practise of permitting the plants to fruit the first season is to be encouraged. Fruit should be accepted when the plant is prepared to supply it, regardless of the ill-effect that early fruiting is assumed, by some growers, to have on the plant.

Plants of summer-bearing varieties seldom flower and fruit until the second year. Plants set in the spring of a given year produce runners freely that year but will not bear fruit in appreciable quantity until the following year. Runners produced early in the season should fruit well the following year and in some cases runners produced as late as August will bear some fruit during the fruiting season of the following June and July.

USE OF FERTILIZERS

Reference to the use of fertilizers on strawberries will be found in the section "Fertilizers and the Fruit Garden" on page 9.

WATERING

Strawberry plants are shallow-rooted and cannot withstand long dry periods. Watering plants of this fruit is desirable at times in most parts of this Province. As indicated in the section on irrigation on page 10, strawberry plants may be watered at any time during the growing season. A good watering should be given when a watering is needed—sufficient should be given to moisten the soil well to a depth of a foot at least—and no more water should be given until the plants need it. Light and very frequent waterings are not recommended. Frequent waterings, especially when given in the evening, often result in serious injury to the plants from mildew.

WINTER PROTECTION

To winter well strawberry plants usually require a special protective covering during the coldest months of the year. This covering should be put on soon after the

ground becomes frozen to remain frozen and before the ground becomes heavily covered by snow. Clean coarse straw or hay is suitable material and this may be applied to a depth of six inches.

As soon as the strawberry plants under the covering show evidence of growth in the spring, the mulch should be removed. If left on too long the covering will injure the plants. The finer parts of the material used may be left between the rows as a mulch to conserve moisture and as an aid in keeping down weeds.

TREATMENT DURING THE SEASONS FOLLOWING

It is usually advisable to plan to take only two crops of strawberries from a plantation. A young plantation is more productive and more easily handled than an older plantation and plantations older than two years tend to become weedy and are seldom satisfactory. This would necessitate starting a new plantation every second year.

If the runners tend, during the second season, to fill the space between the rows the narrowing of the rows may be necessary. Some widening of the rows may be permitted during the second season and the addition of six inches on each side would not be excessive. Any trimming that is necessary may be done with a sharp spade or hoe. Sheep-shears may be useful in cutting the runners in some cases.

Protection during the second winter should be similar to that recommended for the first winter. Young plants appear to be more cold resistant than older plants and the protection given for the second winter should be at least equal to that given the first winter.

Treatment during the season following the second winter consists mainly in keeping down weeds. After the fruiting season is over the plantation may be broken up, if a new plantation has been established to replace the old.

WEED CONTROL WITH 2, 4-D

Strawberry plants are sufficiently tolerant of 2, 4-D to permit the use of the chemical for weed control in the strawberry plantation. Experimental work has demonstrated that it is safe to use 2, 4-D at the rate of one to one and one-half pounds of the acid to the acre. The flowers and fruits of the strawberry are sensitive to the chemical and application must be made either before flowering and fruiting or after fruiting is over. Many weeds, including the dandelion, respond favorably to the treatment.

THE CURRANTS

CLASSES

The cultivated currants are usually divided into three classes on a basis of the color of the fruit. These are: black, red and white. Each group has a distinctive flavor though the red and the white have much in common. The fruit of the white is less acid than the fruit of the red. Fruit of the black currant has been found to be very rich in vitamin C and as a result, interest in the culture of this currant has increased greatly during recent years. Native black currants are found under cultivation occasionally. In some cases, these are preferred to the cultivated varieties, but the fruits of the native forms are usually very strong in flavor and are undersize.

Forms of the Flowering Currant or Golden Currant are sometimes cultivated. The plant of this currant is a strong grower and is more drouth-resistant than are the plants of the common cultivated currants. The fruit is usually large and may be black, red or yellow when mature. The flavor of the fruit is acceptable but it is less juicy than that of the common cultivated forms. Unevenness in the ripening of the currants is an objection to this form of currant but this is not considered serious by most of the growers of this fruit.

VARIETIES

Black-fruited.—Climax, Naples, Saunders, Lee's Prolific, Boskoop Giant and Magnus.

Red-fruited.—Fay's Prolific, Red Cherry, Red Dutch, Red Perfection, Ruby Castle and London Market.

White-fruited.—White Grape, White Cherry and Large White.

Other varieties, too, are giving satisfaction in certain gardens. Two new varieties of red currants, **Stephens No. 9** and **Red Lake**, are outstanding in size of fruit, but have not been sufficiently tested to be recommended for general use.

NUMBER OF VARIETIES TO PLANT

Owing to what appears to be partial self-sterility in the currants, particularly in the black currants, the planting of more than one variety of each kind to be grown is

recommended. If black currants are to be grown, at least two varieties of black currants should be planted. If red currants are to be planted, at least two varieties of this type should be grown. Similar advice is given for the white currants. The planting of three varieties in each case is preferable to the planting of two.

PROPAGATION

The usual method of propagating the currants is by cuttings. The cuttings should be taken in the autumn as soon as the wood is mature, and should be made from wood produced during the previous summer. The wood is usually sufficiently mature for this purpose early in October and if possible they should be made at this time. These cuttings should be made from eight to nine inches long and the lower end of the cutting should be cut square and made just below a bud. At least one-half inch of wood should be left above the uppermost bud in each cutting. The cuttings are usually tied in small bundles and are buried at once in moist, well drained soil out of doors three or four inches below the ground surface. Early in the spring the cuttings are taken up and are planted four to six inches apart in a row in the garden, leaving only the uppermost bud above the ground level. The resulting plants may be left in this row one or two years, depending upon the size attained the first year, but the usual method is to transplant them to the permanent location at the end of the second year.

Where only a few new plants are desired simple layering may be practised. In this case an outside stem is brought in contact with the ground, held in place with a wire loop pushed into the ground and then partially covered with moist soil. At least six or eight inches of the tip should be left exposed. The operation is performed in the spring and the soil covering the section of the branch must be kept moist throughout the summer. Roots will be produced on the part covered. The following spring the rooted section is severed from the branch and is treated as a separate plant.

PLANTING

As in other fruits the planting should be done early in the spring. Plants of the currants are among the first woody plants to begin growing in the spring and it is very important that the planting be done before the buds open.

Plants of the currants should be set at least six feet apart each way in the farm garden. Spacings of eight to ten feet are desirable, however. In the small garden, where waterings can be given, five-foot spacings may be employed.

PRUNING AFTER PLANTING

Immediately after being set, the plants should be cut back severely. The plants should branch close to the ground and the pruning should be done with the object of inducing the formation of this type of plant. Where the top consists merely of an unbranched stem, that stem should be cut back to within two to three inches of the ground surface. Where a properly branched plant has been planted the branches should be cut back to within two or three inches of the bases of the branches.

PRUNING FRUITING PLANTS

To remain in good condition, plants of the currants must be pruned each year. This pruning should be done early in the spring before growth begins.

The method of pruning depends upon the kind of currant to be pruned. This is because currants differ in their fruiting habits. In the Black Currant much of the fruit is borne on wood produced the previous year and a supply of one-year old and two-year old stems will provide a good crop of fruit. In the Red Currant, the best fruit is borne on short spurs on two- and three-year old stems and stems of these ages are depended upon to bear the crop. It is important, therefore, to have a supply of strong one-year old and two-year old stems in the Black Currant and a supply of two- and three-year old wood in the Red Currant. The older wood should be removed as conditions permit it and enough of the younger stems left to replace the older stems and to produce the fruit. From ten to twelve main stems should be present after the pruning has been completed. In the Red Currant, therefore, from three to four stems that have passed the third year will be removed each year and from three to four new stems left to take their places. The plant will thus have, after the pruning has been completed, from three to four one-year old stems, from three to four two-year old stems and a similar number of three-year old stems. In Black Currant, from five to six stems that have passed the second year will be removed each year and a similar number of new stems left to take their places. Each plant of the Black Currant will thus have from five to six one-year old stems and from five to six two-year old stems. The bushes should be kept open in order that the air may circulate around the leaves and fruit freely, and in

order that sunshine may reach every branch. Pruning in the currant is, therefore, a process of renewal. The old wood, wood that has passed the period of greatest usefulness, is removed and the new wood is allowed to take its place. Pruning in the White Currant is the same as that for the Red Currant.

LIFE OF THE PLANTATION

A well cared for plantation of currants should produce well for twelve to fifteen years at least.

WINTER PROTECTION

Further protection against low temperatures than that offered by a shelter-belt is unnecessary in this climate for plants of these fruits.

PESTS

Currant Plant-Louse.—This is a small greenish insect that appears early in the spring and causes considerable damage to the foliage. The leaves attacked become curled and distorted and their upper surfaces become reddish in color. Badly infested plants may lose their leaves and may fail to mature their fruit. The insect passes the winter in the egg stage on the branches and these eggs hatch in the spring about the time the buds are opening.

This pest can be controlled by spraying the plants soon after the buds open, and before the leaves become large, with a solution of tobacco extract and a good laundry soap in water. The best known tobacco extract is "Nicotine Sulphate." This extract may be obtained from seedsmen and from some it may be obtained in small quantities. The materials of the spray are used in the proportion as follows: Nicotine Sulphate, 1 part; soap, 8-10 parts; soft water, 500 parts. The soap should be dissolved in a small amount of hot water and the soap solution then used in making up the amount of spray to be prepared. The application must be made in such a way that the entire body of every insect is covered with the solution. This solution kills by contact and any insect that is not reached with the solution will not be injured. If for some reason the early application has been omitted an application may be made later. If the application is made later, when the leaves are large, great care must be taken to apply the solution to the under surface of the leaf. It is on the lower surface of the leaf where the insects are found during the season and the necessity for reaching the under surface of the leaf with the spray is evident. When the spraying is done just after the buds have opened every part of the plant can be reached readily with the spray and if possible the spraying should be done at this time.

Imported Currant-Worm.—This is a small greenish colored worm that eats the leaves of the plants. It usually appears first during the month of May, but it may be found present during June and early July. If many are present, the plant will be completely defoliated and the fruit will fail to develop normally. The plants are much weakened by such defoliation and if control measures are not applied, the plant will eventually die from exhaustion.

As soon as the pest is seen at work the infested parts should be dusted with derris. This is both a contact remedy and a food poison and worms dusted with it may cease feeding and drop to the ground in a few minutes. A second application at a later date may be necessary. Derris is not highly toxic to humans and an application of this remedy can be made to the infested plants, with perfect safety, a short time before the fruit is to be harvested. As soon as it becomes available in quantities, derris should be used at all times for the control of this pest. Dusting may be accomplished by placing the dust in a small porous bag and shaking the bag lightly over the parts of the plants requiring treatment.

Currant Fruit-Fly.—This pest is usually referred to as the "Currant Maggot" because the injury is done by the larvae or maggots feeding in the fruit. It attacks the fruits of the currants and gooseberry. The maggots feed on the pulp and the seeds. Infested fruits usually color prematurely and many of these may drop to the ground before the normal time for harvesting the fruit arrives.

The adult is a small two-wing fly that appears about the close of the flowering period for these fruits. Not until about ten days later do the females begin laying their eggs. During this ten day period they fly about in and near the currant and gooseberry plantation. The eggs are laid in the tiny fruits and once the eggs are laid, control is not practicable without destroying the fruits.

Much may be accomplished in the control of this pest by spraying the plants in the plantation with DDT according to the directions supplied by the manufacturer of the chemical. The first application should be made just after the petals shrivel or fall and a second application should be made about ten days later. Both applications should be thorough and the foliage should be well moistened with the spray.

Tent Caterpillar.—Different forms of the Tent Caterpillar are found in the Canadian West, but the one usually present on currants and the gooseberry builds a web and this web increases in size as the caterpillars increase in size and as the season advances. Eventually the web may become very large and a large part of the plant may become involved. The pest is usually found within the web during the warmest part of the day. When fully grown the caterpillars may be one and one-half inches in length.

The best control measure for this pest is that of removing the web during the warmest part of the day with the hand and placing the web and its contents on a flat surface below a foot of a heavy man.

Where the form that does not build a large web is present, dusting with derris may be resorted to. In this case, the treatment recommended is that outlined for the control of the Imported Currant-Worm. The treatment should be given early and before appreciable injury to the plant has been done.

Gooseberry Mildew.—This disease occurs on the currant as well as on the gooseberry and it is characterized by a whitish or grayish mouldy growth on the parts attacked. The leaves may take on a brown color late in the season. In some cases the twigs and the fruit also are attacked. All plants that are likely to be attacked should be sprayed with a solution made up by dissolving one ounce of Liver of Sulphur in two gallons of water. Five applications may be necessary. The first application should be made at the time the buds are bursting, the second application just before the flowers open, and the later applications recommended should be given at intervals of ten days. Dry Lime-Sulphur may be used in place of Liver of Sulphur and it should be used as a spray, prepared according to directions on the container. The applications should be made as for Liver of Sulphur. Merely dusting the plants with ordinary dry sulphur (Flowers of Sulphur) is usually sufficient to keep the disease in check. Place the sulphur in a porous bag and shake the bag over the plants to be treated. These treatments will merely protect the uninfected parts of the plant and prevent the disease from spreading.

THE GOOSEBERRY

Though less popular than most other fruits, the gooseberry has a place in the home fruit plantation. For certain types of preserves and for pies, the fruit is unsurpassed in the eyes of many people from the "Old Land." To many Canadians the gooseberry is of little importance at the present time, but with the possibility of the origination of satisfactory spineless varieties it promises to occupy, in the prairie garden, a more prominent place than it has in the past.

CLASSES

The gooseberries grown in Saskatchewan can be divided into two general classes on a basis of origin of the variety and the size of the fruit. One class comprises the large-fruited varieties that possess in their make-up at least a predominance of the characteristics of the European gooseberry. The plants of these vary considerably in their hardiness, but all show tenderness in this climate. Without winter covering the plants kill back badly and in some cases killing out completely has occurred. This class is not recommended for general culture. The other class comprises the smaller fruited varieties, in which the characters of American gooseberries predominate. The plants of these possess hardiness in a fair degree at least. Though somewhat smaller or of medium size, the fruits of these are very acceptable. Gooseberries of the latter class only are recommended for culture in Saskatchewan.

VARIETIES

The variety recommended above all others is **Pixwell**. The fruit is of medium size only but it hangs on long stems well below the recurving branches and can be harvested easily. The plants are hardy and are very productive. The fruit is pink at maturity.

A green fruited variety that has gained some popularity is **Oregon Champion**. The fruit is larger and of better quality than that of Pixwell, but the plants usually kill back considerably.

Houghton, a pink fruited variety, and one that has been popular in the past, is being replaced by Pixwell. The fruits of these two varieties are of about the same size, but that of Houghton is more difficult to harvest than that of Pixwell.

Pembina Pride or **Thoreson** is a medium size green fruited variety that is hardier than Oregon Champion and that is giving promise in Saskatchewan gardens. The fruit of this variety tends to drop as maturity approaches and harvesting early is desirable.

Clark is an excellent large fruited variety that might be grown where very large fruit is desired and where the plants can be given some covering. Spineless varieties cannot be recommended as yet.

PROPAGATION

The gooseberry is propagated by layering. The simplest method where only a few plants are required is that of bringing a few branches in contact with the ground in the spring and covering a portion of the stem with soil. The tip of the branch should be left exposed. The covering should be to the depth of three to four inches and this soil must be kept moist during the whole growing season. By autumn, roots will have formed on the portion of the stem below the ground. The rooted portion should be given additional covering of soil before winter sets in and the branch left undisturbed until spring. In the spring the rooted portion of the branch is dug up and is separated from the remainder of the branch just below the newly formed roots. This rooted portion is treated as a separate plant and is planted at once in a suitable location. In the variety Pixwell, natural layers are common. Branches frequently come in contact with the ground and root without the aid of man.

Another form of layering and one that is suitable for use where large increase is desired is that of cutting back the plant to be used to within six inches of the ground level early in the spring. From the bases of the branches left, new shoots arise. When these new shoots have reached the height of a few inches, soil is banked around the base of the bush. As the shoots increase in length, more soil is used. This is continued until four to six inches of the bases of the new shoots are covered. This bank of soil must be kept moist throughout the season. By autumn, roots will have formed on the lower portions of the new shoots. Early the following spring, the bank of soil is removed carefully, the rooted shoots severed from the parent plant and these shoots treated as separate plants. They are usually grown in a row a few inches apart for one year before being planted in the permanent location.

PLANTS

Strong, well rooted plants should be employed. Either one- or two-year old stock should prove satisfactory.

PLANTING

As in the currants, plants of the gooseberry should be planted early in the spring. Opening of the buds begins earlier in the gooseberry than in the currants and very early planting is desirable in this fruit.

Spacings for plants of the Pixwell gooseberry should be similar to those used for plants of the currants. Six-foot spacings in the row with the rows six feet apart, where more than one row is to be grown, should be considered the minimum for the farm garden. Wider spacings than these are advantageous. While five-foot spacings are usually ample for most other varieties, even for these, at least six-foot spacings are recommended. For small gardens closer spacings may be necessary.

PRUNING AFTER PLANTING

The pruning immediately following planting is much the same in the gooseberry as in the currants. Branching in the plants near the ground is desirable and this may be induced by cutting back the newly set plants to within two or three inches of the ground level. If a branched plant is set, merely cutting the branches back to within three or four inches of their bases will insure the necessary further branching.

PRUNING FRUITING PLANTS

Pruning in the gooseberry is similar to that in the red and white currants. In the gooseberry some fruit is borne on one-year old wood, but most of it is borne on spurs on two- and three-year old wood. From eight to ten main branches should remain and these should be well distributed. These should be made up approximately of three one-year old branches, three two-year old branches and three three-year old branches. All branches over three years of age and those in contact with the ground should be removed. A free circulation of air should be provided for and sufficient pruning should be done to maintain an open bush. The pruning should be done in the spring before growth begins.

LIFE OF THE GOOSEBERRY PLANTATION

If well cared for, gooseberry plants will continue to fruit for many years. Ten to fifteen crops of fruit can be harvested if good cultural treatment is given.

PESTS AND DISEASES

The pests and diseases attacking currants attack gooseberries also. Controls for these are outlined under the currants.

THE GRAPE

Though one of the less important fruits grown in Saskatchewan, the grape is finding a place in many fruit plantations in this Province. The grape is more difficult to grow successfully than most other fruits, but with proper care the plants will yield a product that makes the effort necessary worthwhile. Further, the grape adds an interest to the fruit plantation and from this standpoint alone the growing of this fruit is a profitable undertaking.

CLASSES

The grapes grown fall naturally into three classes. In the first class are those derived directly from the European grape. Representatives of this class are found in the large red and black grapes imported during the winter and sold in stores at that season. Raisins, too, belong to this class. The fruits of these grapes are relatively sweet and of fine quality, but the plants are very tender. The culture of these in America is restricted to certain special areas. The second class are the commercial varieties grown in sections of Eastern Canada and British Columbia and in many States of the Union. These are mainly hybrids between European grapes and grapes native to the milder parts of Canada and parts of the United States and the plants are not sufficiently hardy to be recommended for general culture in Saskatchewan. A third class are a few varieties that are hybrids between the commercial grapes of the second class and a very hardy grape native of the Great Plains area and occurring in Manitoba. Plants of certain varieties in this class possess much hardiness and can be grown successfully in Saskatchewan. The fruits of these are of fair size and quality and make excellent jam and jelly. The fruit of the grape native to Western Canada is small, is very sour and has little culinary value. The plant is often used as a hardy woody climber grown for ornamentation.

VARIETIES

The most common varieties grown are **Alpha**, **Beta** and **Hungarian**. The plants of these three varieties appear to be nearly equal as far as hardiness is concerned. The fruits, too, are similar, though the fruits of Hungarian is usually slightly larger and of a little better quality than the fruits of the other two varieties.

PROPAGATION

The hardy varieties of grapes may be propagated either by stem cuttings or by layering. The cuttings are taken in the fall from fully matured shoots of the current season's growth and are made to take in two buds. The base of the cutting is made just below a bud and the apex a short distance above the other bud. The cuttings are buried a few inches deep in moist soil out of doors immediately after being made and are left there until the following spring. In the spring the cuttings are taken up and are planted in prepared soil at an angle of thirty to forty-five degrees with the earth's surface and sufficiently deep to bring the upper bud just above the ground surface. The usual plan is to plant them in a row in the garden and the spacing between the cuttings might be from six to nine inches. The plants resulting from the cuttings may be left in the row one or two years, depending upon the amount of growth made during the season of planting, and are then planted in the permanent location.

PLANTING

Planting in the grape should be done early in the spring. The plants are usually set about eight feet apart in the row.

SUPPORT FOR THE VINES

The vines of the grape should be given support. Satisfactory support may be found in three wires running the length of the row stretched on posts. The bottom wire may be near the ground and a height of nine to twelve inches is satisfactory. The second wire may be from eighteen to twenty-four inches above the first and the third a similar distance above the second.

PRUNING AND TRAINING

To fruit well and consistently plants of the grape must be pruned annually. The first pruning is given at planting time and each year thereafter this operation must be repeated to keep the plants supplied with the wood required for heavy fruiting. With the exception of that necessary at planting time, all the pruning should be done in the fall before the plants are covered for winter.

Different systems of pruning are used for the grape. One that suits Saskatchewan conditions well is outlined below.

Only one stem or cane should be left on the plant at planting time. This should be cut back to a point a short distance beyond the second bud. From the two buds left two stems should develop.

In the autumn of the first year the weaker of the two stems that developed should be removed and the one remaining should be cut back to two buds before the plant is covered. Two stems should develop from these buds during the following growing season.

The pruning in the fall of the second year is similar to that given in the fall of the first year in that the weaker stem is removed. The one left should be cut back to six or seven buds. In the spring of the third year this vine, which has been lying on the ground until this time, should be lifted, placed parallel to the bottom wire and tied to it. The shoots developing from the six or seven buds should be tied in vertical positions, as they elongate, to the second and third wires.

In the fall of the third year all the upright shoots or stems are cut back to two buds. The base of such a shoot or stem that has been cut back will be referred to as a spur.

During the summer of the fourth year two shoots will develop from each spur left the autumn before. In the autumn of the fourth year these shoots or stems are cut back to one bud.

Pruning in the autumn of each subsequent year is the same as that in the autumn of the fourth year. Each shoot is cut back to one bud which gives rise to the shoot developing the following year.

WINTER PROTECTION

In the northern sections of the Great Plains region, plants of the grape require special protection during the winter. Both the stems and the roots are tender. A good covering of soil will provide ample protection for the varieties usually grown. Where the plants are pruned and trained as outlined above, removal from the trellis may not be necessary. The pruned plants are merely covered by banking soil well over the horizontal trunks and the spurs that have been left on its upper side. The horizontal stem may be separated from its wire support and placed nearer the ground level for the winter if this will facilitate covering. A similar covering of soil is used in this case and this can usually be given more easily than when the horizontal stem occupies its summer position. Sufficient soil should be banked around the stem and over the vines to give the plants good protection. A covering of two or three inches should be sufficient. The covering should be removed in the spring before growth begins.

PESTS

Grape Leaf-Hopper.—This is a small light colored insect that is found usually on the under side of the leaf of the grape and the Virginia Creeper. When disturbed the adults take to wing. Both immature and mature forms feed by sucking the juices from the leaves. The leaves attacked become blotched and if the infestation is heavy they will shrivel and die. Plants may become completely defoliated by this pest. Feeding usually begins on the lowest leaves and as time goes on the insects move to the leaves above. Eventually the uppermost leaves fall a prey to the pest and the plant may lose all its leaves before the summer is over.

Control can be effected by thorough treatment given early and as soon as the pest is found present. Spraying the plant with a DDT spray two or three times the normal strength so that the under side of the leaf is well wet with the spray is an effective remedy. All the leaves should be sprayed whether they are infested or not. DDT retains its virtue as a poison for some time and leaves that are coated on the under surface with this agent are unlikely to show appreciable injury by this pest. One treatment should be sufficient but a second treatment should be given if necessary. Since the adults winter on the ground under the protection of leaves and other rubbish it is a good plan to rake up and burn such materials before winter sets in. Cutting infested plants back to the ground level, as has been practised in some cases with Virginia Creeper, is without virtue and is not recommended.

NATIVE FRUITS

THE JUNE BERRY ("SASKATOON")

The Juneberry or Saskatoon is a much prized native fruit. Two forms of this are common in this Province. One is a tall growing form, often reaching a height of fifteen to twenty feet, and the other is a low growing form which seldom exceeds the height of three feet. The fruit is usually purplish-blue or purplish-black in color, but white

fruited forms and red fruited forms occur. Considerable variation in the size of the fruit is found, but the average size is about that of a small pea. The fruits are juicy, low in acid and are very palatable. For preserves and pies this fruit is unsurpassed by other native fruits.

Little improvement work has been done on this fruit. While differences in size of the fruit are found in nature, these differences appear to be the result mainly of differences in the environment of the plants and not in the make-up of the plants. Further exploration may reveal types that are definitely superior and which may provide suitable material for the improvement of this fruit.

Plants of the ordinary type of Juneberry are worthy of cultivation. It is a fruit that responds well to good cultural treatment. Where such treatment is given, the fruits become larger than those usually found in nature and heavy yields of fine fruit may be obtained.

Since seeds are often slow in germinating and seedlings slow in developing, transplanting plants from the wild state is the method usually employed in making a beginning in the cultivation of this fruit. Plants are not easily transplanted and the transplanting of small plants is more likely to be successful than the transplanting of large plants. Plants eighteen to twenty-four inches in height are a convenient size to move and such plants can be moved without the expenditure of an undue amount of effort. The operation should be performed early in the spring. The stems should be cut back to a level of six or eight inches from the ground after the plants have been set in their new location. The plants may be set six to eight feet apart in the row.

THE BLUEBERRY

The blueberry demands an acid soil and its natural range is restricted to areas where the soil reaction suits its needs. In such areas the plants thrive and bear good crops of fruit. On soils alkaline in reaction the blueberry fails to thrive.

Since the soil in most gardens in this Province is alkaline in reaction and possesses a large reserve of lime the addition of this fruit to the collection of fruits for the home garden is not practicable. Further, acidifying our soils as often suggested, is not practicable, in most cases at least. The cultivation of this fruit in the Saskatchewan garden should not be attempted unless the soil has the reaction demanded by the plant.

THE CHOKECHERRY

This cherry is found growing under a variety of conditions, though it tends to favor areas provided with more than the average supply of moisture. It thrives on high land where good cultural treatment is given and where the plants are not crowded. The fruit is often sought for the making of jelly though one should not overlook the necessity for the addition of commercial pectin or of juice of a fruit containing pectin in quantities to insure the proper setting of the jelly. The plant makes a fine ornamental shrub and it is often grown for the two purposes. An objectionable feature of the plant is its suckering habit. A yellow-fruited form has been offered by nurserymen and has been planted in many gardens. The fruit of this form is often stated to be less astringent than the fruit of the ordinary form, which is correct, but the difference is not very great when the fruits, in both cases, are fully ripe. The yellow fruited form will not come true from seed.

For transplanting, plants two to three feet in height are satisfactory. Many of the plants growing in the wild state have poor root systems and only those with at least a few fibrous roots should be replanted. The transplanting should be done early in the spring. The newly set plants should be cut back to within a few inches of the ground level. Spacings of eight to ten feet should be satisfactory for plants to be set in the fruit garden.

THE PIN CHERRY

The pin cherry is less known than the chokecherry, though plants of it are abundant in many areas. Like that of the chokecherry, the plant of this fruit has a tendency to sucker. The fruit is a small red cherry, borne in small clusters and with high acidity, suggesting a very small commercial sour cherry. The plant of this cherry is usually less fruitful than the plant of the chokecherry, though good crops often occur. Fruits on cultivated plants are often considerably larger than those on plants in the wild state. Excellent jelly may be made from the fruit and though requiring considerable sugar, preserves of this cherry are delicious.

Plants of this cherry, too, are often poorly rooted and many dug up from a thicket should be discarded. Only well rooted plants should be replanted. Spacings of eight feet are satisfactory where the plants are to be grown in the fruit plantation. The transplanting should be done early in the spring.

THE Highbush Cranberry

This fruit is not a true cranberry but is related to a native shrub known as the Nannyberry and to the old fashioned "Snowball." The seeds of the true cranberry are small and are present in the fruit in numbers. Only one pit-like structure is present in the fruit of this plant and this pit is large, taking up a very considerable part of the fruit. The fruit is scarlet, is borne in clusters and makes very outstanding jelly. The plant grows to a height of five to eight feet. It does well under cultivation and is frequently grown as an ornamental shrub.

Plants of this fruit usually have numerous fibrous roots and are not difficult to transplant. The transplanting should be done early in the spring and small plants should be moved rather than large plants. Spacings of six to eight feet are ample for this plant.

THE MOUNTAIN ASH

Though seldom considered a native to this Province, this tree has been found growing in the wild state in the woods in the North. The plant has attractive foliage, flowers and fruits and is grown chiefly as an ornamental. The fruit makes fine jelly and is much prized by many people from "across the sea."

Plants of the Mountain Ash are easily grown. Wide spacings should be employed and distances of fifteen to twenty feet, at least, should be allowed between plants. Owing to the susceptibility of the plants to sun-scald, trunks should be eliminated and the branching should take place near the ground.

ACKNOWLEDGMENTS

The photograph appearing on the front cover page was furnished by Miss R. Ducie, The Western Producer, Saskatoon, Sask. This is gratefully acknowledged.



